# PACiS SCE

## System Configuration Editor

## SCE/EN O/C40

Version 4.5

## Operation Guide

Schneider Electric

# PACiS SCE
# OPERATION GUIDE

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# SAFETY & HANDLING

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# 1. INTRODUCTION

This document is a chapter of PACiS System Configuration Editor PACiS SCE V4.5 documentation binder. It describes the safety, handling, packing and unpacking procedures applicable to PACiS SCE software tools.

# 2. SAFETY

WARNING: THIS SAFETY SECTION SHOULD BE READ BEFORE COMMENCING ANY WORK ON THE EQUIPMENT.

## 2.1 Health and Safety

The information in the Safety Section of the product documentation is intended to ensure that products are properly installed and handled in order to maintain them in a safe condition. It is assumed that everyone who will be associated with the equipment will be familiar with the contents of the Safety Section and all Safety documents related to the PC and Communication networks.

## 2.2 Explanation of symbols and labels

The meaning of symbols and labels may be used on the equipment or in the product documentation, is given below.

## 2.3 Installing, Commissioning and Servicing

**Equipment operating conditions**

The equipments (PC supporting PACiS SCE) should be operated within the specified electrical and environmental limits.

**Fibre optic communication**

Optical LED transceivers used in Switch boards are classified as IEC 825-1 Accessible Emission Limit (AEL) Class 1 and consequently considered eye safe.

Optical power meters should be used to determine the operation or signal level of the device.

## 2.4 Decommissioning and Disposal

**Disposal:**

It is recommended to avoid incineration and disposal of the PACiS SCE CD-ROM. The product should be disposed of in a safe manner.

## 3. GUARANTIES

The media on which you received Schneider Electric software are warranted not to fail executing programming instructions, due to defects in materials and workmanship, for a period of 90 days from date of shipment, as evidenced by receipts or other documentation. Schneider Electric will, at its option, repair or replace software media that do net execute programming instructions if Schneider Electric receive notice of such defects during the guaranty period. Schneider Electric does not guaranty that the operation of the software shall be uninterrupted or error free.

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In any application, including the above reliability of operation of the software products can be impaired by adverse factors, including -but not limited- to fluctuations in electrical power supply, computer hardware malfunctions, computer operating system, software fitness, fitness of compilers and development software used to develop an application, installation errors, software and hardware compatibility problems, malfunctions or failures of electronic monitoring or control devices, transient failures of electronic systems (hardware and/or software), unanticipated uses or misuses, or errors from the user or applications designer (adverse factors such as these are collectively termed "System failures").

Any application where a system failure would create a risk of harm to property or persons (including the risk of bodily injuries and death) should not be reliant solely upon one form of electronic system due to the risk of system failure to avoid damage, injury or death, the user or application designer must take reasonably steps to protect against system failure, including -but not limited- to back-up or shut-down mechanisms, not because end-user system is customised and differs from Schneider Electric testing platforms but also a user or application designer may use Schneider Electric products in combination with other products.

These actions cannot be evaluated or contemplated by Schneider Electric; Thus, the user or application designer is ultimately responsible for verifying and validating the suitability of Schneider Electric products whenever they are incorporated in a system or application, even without limitation of the appropriate design, process and safety levels of such system or application.

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# INTRODUCTION

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# 1. INTRODUCTION TO PACiS

The PACiS range will continue to be expanded. The general features of PACiS will also be enhanced, as we are able to adopt new technology solutions.

For up-to-date information on any PACiS product, visit our website: www.schneider-electric.com

# 2. INTRODUCTION TO PACiS GUIDES

This version of the PACiS SCE documentation refers to version PACiS V4.5. The guides provide a functional and technical description of the PACiS System Configuration Editor - PACiS SCE adapted to PACiS V4 (IEC61850 Station Bus) and a comprehensive set of instructions for the PACiS SCE's use and application.

PACiS SCE guides is divided into two volumes, as follows:

- Operation Guide: includes information on the application of the PACiS SCE and a technical description of its features. It is mainly intended for protection & control engineers concerned with the selection and application of the PACiS SCE for the Configuration of PACiS solution or of any of the PACiS equipment.
- Technical Guide: contains information on the installation and commissioning of the PACiS SCE, and also a section on fault finding. This volume is intended for site engineers who are responsible for the installation, commissioning and maintenance of the PACiS SCE application.

## 2.1 Chapters description

2.1.1 Chapter Safety (SA)

This chapter contains the safety instructions, handling and reception of electronic equipment, packing and unpacking parts, Copyrights and Trademarks.

2.1.2 Chapter Introduction (IT)

This is this document containing the description of each chapter of the PACiS SCE guides. It is a brief introduction to PACiS SCE capabilities.

2.1.3 Chapter Functional Description (FT)

This chapter contains a description of the product. It describes the functions included in PACiS SCE.

2.1.4 Chapter Technical Data (TD)

This chapter contains the technical data including, accuracy limits, recommended operating conditions, ratings and performance data.

It also describes environment specification, compliance with technical standards.

2.1.5 Chapter HMI, Local control and user interface (HI)

This chapter contains the operator interface description, Menu tree organisation and navigation, Setting/configuration software.

2.1.6 Chapter Installation (IN)

This chapter contains the installation procedures.

2.1.7 Chapter Commissioning record sheet (RS)

This chapter provides detailed record sheets to commission PACiS SCE.

2.1.8 Chapter Settings (ST)

This chapter contains the list of the setting with defaults values and range of the PACiS SCE.

2.1.9 Chapter Maintenance, Fault finding, Repairs (MF)

This chapter provides advice on how to identify failure modes, fault codes and describes the recommended repair actions.

2.1.10 Chapter Problem analysis (PR)

This chapter provides practical examples of problem solving and company contact information. It includes all information on the self-checking features and diagnostics of PACiS SCE.

2.1.11 Chapter Lexical (LX)

This chapter contains lexical description of acronyms and definitions of the PACiS SCE.

**2.2 Operation guide**

This binder contains the following chapters:

SA, IT, TD, FT, HI, AP, LX

**2.3 Technical guide**

This binder contains the following chapters:

SA, IT, TD, FT, IN, ST, RS, MF, PR, LX

# 3. INTRODUCTION TO PACiS SCE APPLICATIONS

The PACiS SCE Applications are mainly defined in the Application chapter (AP) of each PACiS equipment (MiCOM C264/C264P, PACiS GTW, PACiS OI).

# TECHNICAL DATA

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# 1. SCOPE OF THE DOCUMENT

This document is a chapter of PACiS System Configuration Editor PACiS SCE V4.5 documentation binder. It describes the Technical Data (SCE/EN TD) of this set of software applications.

## 2. REQUIREMENTS

The following tables give the minimum hardware requirements to run correctly PACiS SCE application.

| | |
|---|---|
| **Type of PC** | Standard desktop with CPU Centrino Duo 1.7GHz or upper |
| **RAM** | 1 GB RAM |
| **Hard Disk** | 80 GB - FT32 format |
| **CD-ROM Reader** | |
| **Operating System** | Windows 2000 Professional SP4, 2000 Server SP2 or Windows XP SP2 |
| **Graphical** | VGA screen 256 colours minimum, resolution 1024*768 or upper |
| **Optionally** | Ethernet port, CD-Writer for database exchange |

## 3. CAPABILITIES

The capabilities of PACiS SCE application allows to define the maximal configuration of a PACiS project. The cardinality limits of the different components of a PACiS project are described in the chapter PACiS SCE/EN MF § 2.2.

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# FUNCTIONAL DESCRIPTION

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# 1. SCOPE OF THE DOCUMENT

This document is a chapter of PACiS SCE V4.5 documentation binders. It is the functional description of PACiS System Configuration Editor software application dedicated to the PACiS system and sub-systems.

# 2. PACiS SCE ARCHITECTURE

## 2.1 General Description

The System Configuration Editor (PACIS SCE) is the central tool in charge to manage the PACiS system database for the PACiS equipment. The system configuration database contains the configuration data for the PACiS system equipment:

- PACiS OI the Operator Interface
- PACiS SMT the System Management Tool that download Databases
- PACiS GTW the Tele control gateway
- MiCOM Computers C264 & C264P
- PACiS ES the Equipment Simulator

The PACIS SCE allows some authorised personnel to interact with the PACiS system configuration:

- modelling of coherent system configuration data: devices, electrical topologies, graphical mimics, automations
- generation of configuration data-file for IEC61850 devices of the PACiS project

To generate any equipment database, the PACIS SCE manages:

- Inner data of the device itself (structure and parameters values)
- Exchange data of the device with other system devices
- Exchange data of the device with non-system devices

With the 3rd case, the PACIS SCE manages the communication with all non-PACiS devices with typically IED or protection devices on Legacy BUS or system network. It is only by the configuration of communication mapping that PACIS SCE can handle non-PACiS devices.

## 2.2 Functional Specification

PACiS System Configuration Editor is a tool that:

- helps in definition/edition of equipment data with specific editors (attribute, mimic, ISaGRAF) or with queries on configuration
- generates equipment databases

The definition of data is done firstly by the definition by developer experts of templates or models of data. These templates are then stored and delivered in PACIS SCE libraries. In a second time, the models can be loaded and instanced as a clever kind of duplication to create object data customised to the application case.

When all data of the concrete case are defined, the PACIS SCE generates a coherent set of databases that can be loaded into each system equipment.

### 2.2.1 PACIS SCE Users

Control access of an operator is realised through a login and password capture.

Different levels of operators are distinguished depending on its role:

- ***Level 1*** allows the modification of an existing configuration by adjustment of parameters, settings or graphical representations. The users of level 1 can also add or remove elements derived from the user template libraries. They can generate PACiS application databags. Level 1 users are typically final users.
- ***Level 2*** allows the modification of an existing configuration by adding or removing elements derived from the user templates libraries. They can break the links between the templates and the instantiated objects. Like level 1 users they can generate PACiS application databags. Level 2 users are Integrators and VARs.
- ***Level 3*** users have the capability to modify and create new templates derived from the existing template libraries. They can generate PACiS application databags but also template libraries. User of level 3 will be all T&D-EAI PACiS specialists.
- ***Level 4*** users are PACiS SCE experts. They can modify and create the templates directly from the structural database elements. Their PACIS SCE user level allows also the management of all template databases and the administration of the structural database. The level 4 users are the PACiS SCE administrators.

Such categories is only an outline of PACIS SCE users since several of its tools thanks to specific editors, or report managers, can provided the records needed by other tasks: commissioning cubicle, mapping extraction, etc.

### 2.2.2 PACIS SCE Template & Object

A **database** is basically a collection of persistent data. In the PACIS SCE framework, a database is a collection of **objects**. Any object has its specific **attributes**, organised in categories and subcategories. The objects are organised in the database by following pre-defined association rules.

The **structural database** defines **object types** and **association types**. Association types are **hierarchical link types** and **relation link types** between object types. Hierarchical links are defined for father/child associations. Relation links are defined for other associations, and may hold attributes. **Cardinalities** are defined for all associations.

A **library database** contains **templates**. A template is a collection of objects/associations instantiated from the structural database or from others templates.

A **configuration database** contains objects/associations instantiated from types of the structural database or from templates. It also contains its own templates, created specifically for the configuration, or imported from a library database. A configuration database defines all data needed by system devices to feel up customer application.

All the database elements support internationalisation (multiple languages).

### 2.2.3 Database creation process

To create the database downloaded to system devices, the common way is to:

- Import a template from an external library into current database (in its template area)
- Customise the template if needed in DB template area
- Instantiated the template from template to Object part of the database
- Feel up predefined attribute known as degree of freedom (for example the name)
- Generate devices databases

The link between template and instantiated object can be kept. Nevertheless this relation can be broken for deep object modifications.

During all this creation process, the PACIS SCE make control in data coherency with its Data Model. The checks are made with templates and objects. The checks are mare during configuration edition and/or by a check action. They are done on:

- Attribute input
- Relation creation
- Generation

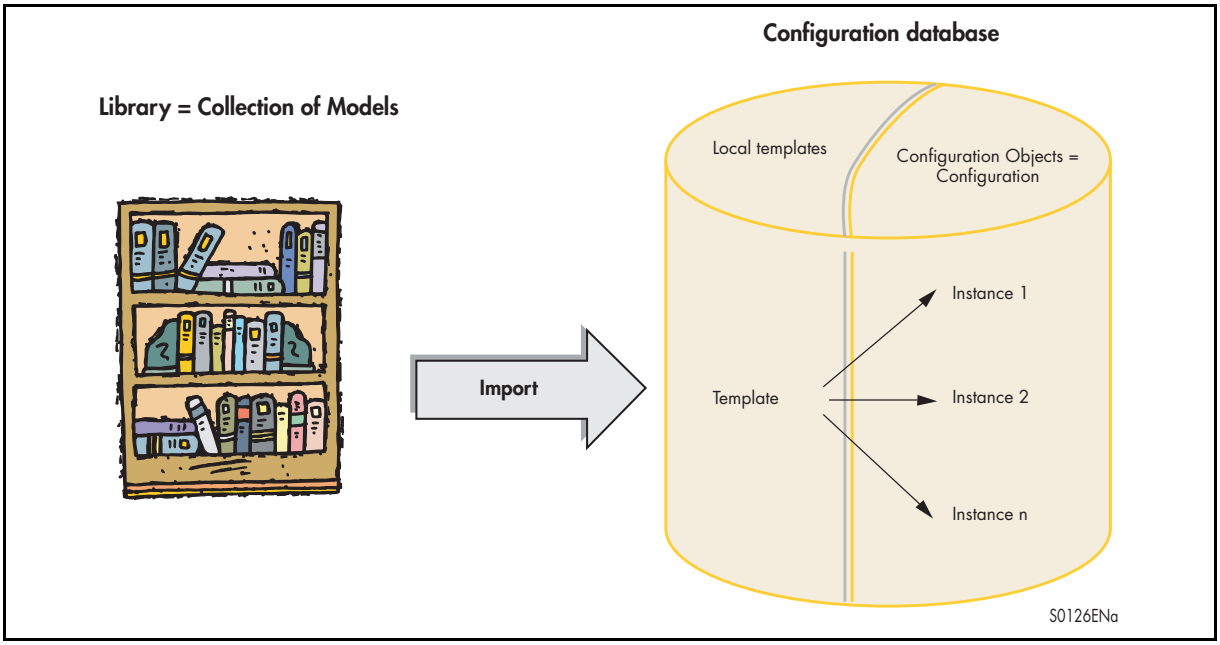


FIGURE 1: CONFIGURATION PROCESS

2.2.4 Version & release

Along time, system's device features have evolution and their inner data base structure is subject to modification. PACiS SCE need to feel the new requirement and has also evolutions and corrections referenced by version.

A unique reference determines the coherent set of system equipment database and soft/hard equipment that PACIS SCE can be used.

PACIS SCE can be compared two referenced versions of a configuration.

## 2.3 External Interfaces

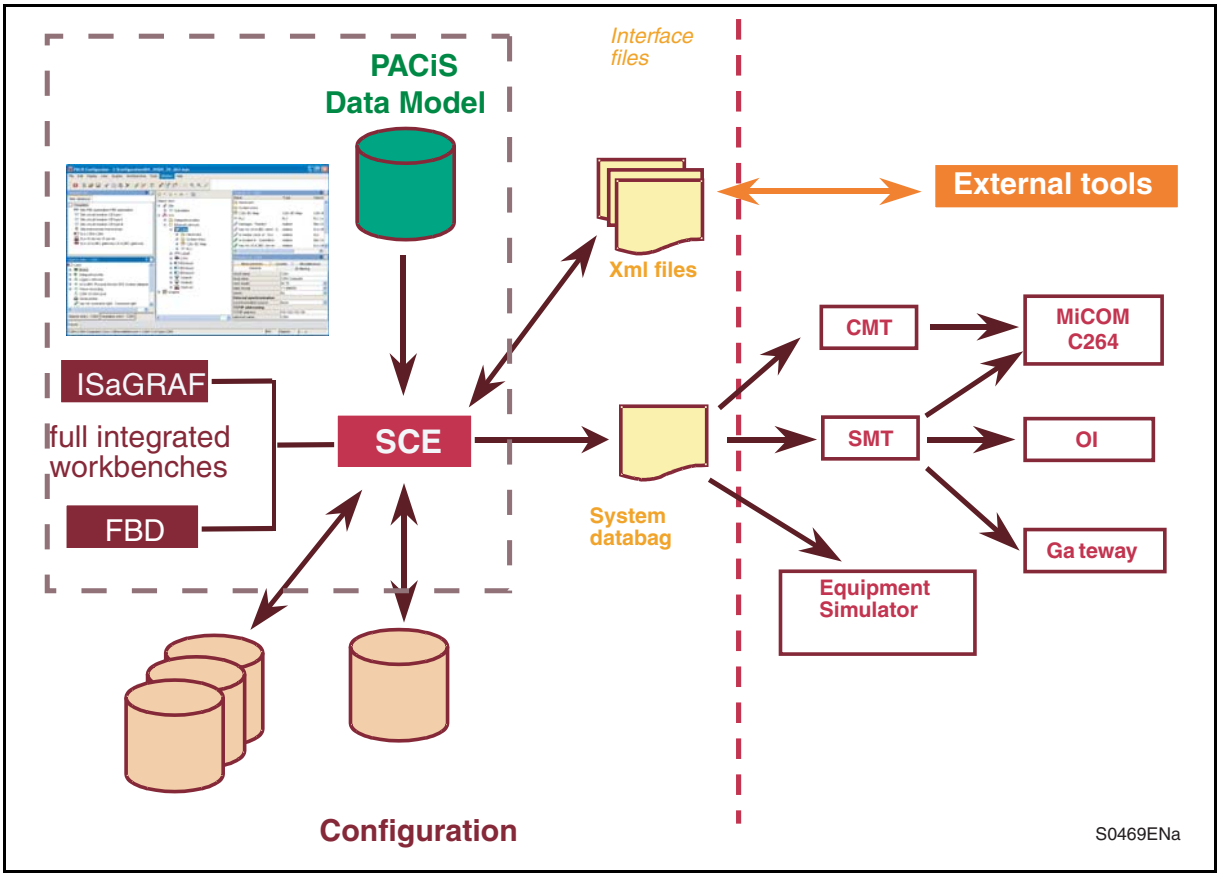


FIGURE 2: EXTERNAL INTERFACES

There is no software interfaces between PACIS SCE and other external tools or PACiS devices.

External interfaces are implemented throw files:

- Xml files: the user can export or import a whole configuration or only a subset. A PACIS SCE exchange Xml format is defined for describing files which are:
- exported from PACIS SCE to an external tool.
- imported from an external tool to PACIS SCE.
- System databag: from a referenced version of a configuration, PACIS SCE generates an application databag for each PACiS devices. The application databags are bagged in a System databag. The system databag are used by PACiS SMT to download application databag in each PACiS devices. This system databag could be used by PACiS simulator tools.
- Reports: the user selects a whole configuration or only a subset and asks a report. A predefined report pdf format is delivered with PACIS SCE.

## 2.4 Human Interface

### 2.4.1 PACIS SCE General Display

At initial start-up or after installation of new version, the PACIS SCE application display can be seen as represented below (as far as user has all PACIS SCE rights and licences). It should be noticed that all parts are not necessary needed for all kind of user.

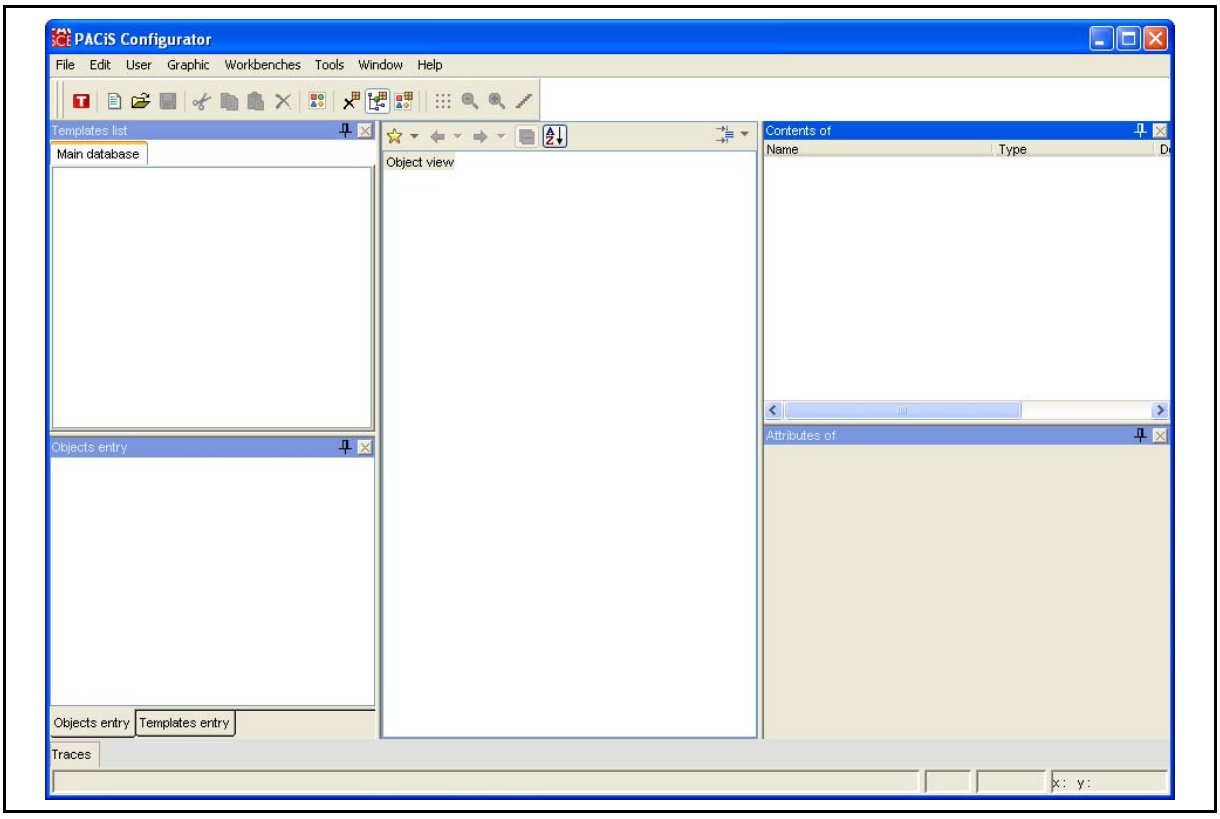


FIGURE 3: PACIS SCE DISPLAY AT START-UP

The staring view is empty. Explanation of each area is given below with some information on it.

For displaying information it is needed to load a database. After such database load, the PACIS SCE application looks as below.

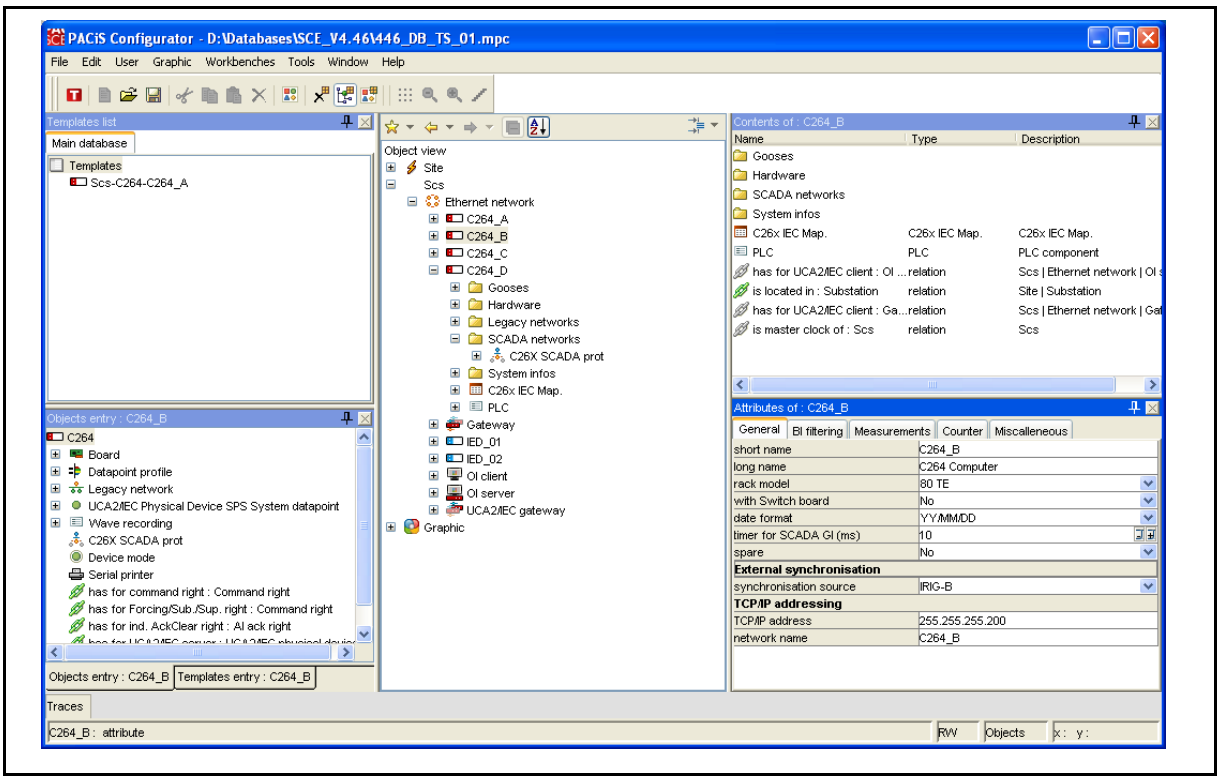


FIGURE 4: PACIS SCE DISPLAY WITH LOADED DATABASE

The display is composed of 5 areas:

- Title Bar
- Menu Bar
- Tool Bar
- Docking Window or common work area composed of several on line optional and customisable areas.
- State Bar

### 2.4.2 Working or Docking Window

By default or selecting all items in Menu Bar/Windows option items, the working area is displayed with all areas as below:

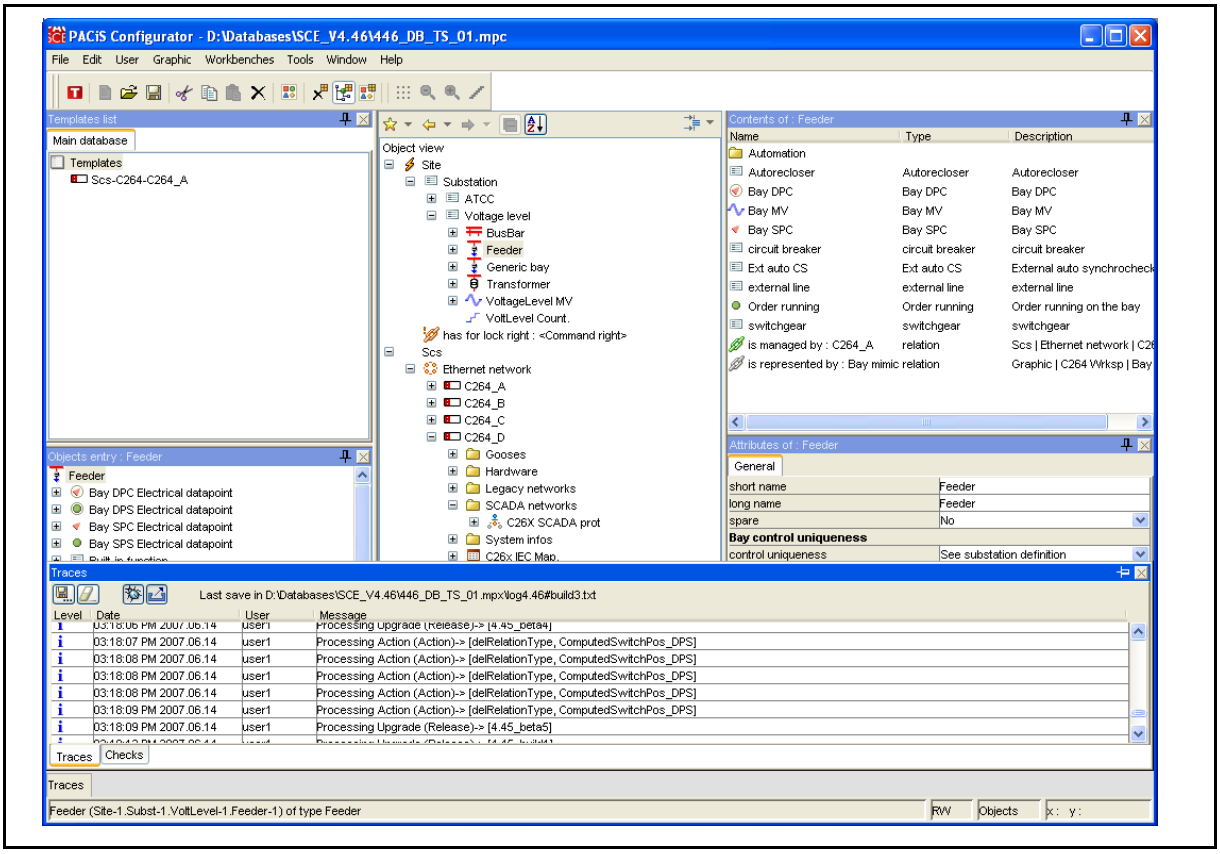


FIGURE 5: DOCKING WINDOW

Areas are viewers driven by:

- Navigator perspective Tree Viewer
- Mimic Editor

When selecting object (click, enter) all views are “refreshed” with corresponding data:

- Components List (Object/relations under selected object)
- Attributes List (of object selected)
- Template Entry List (of existing template of that can be added under selected object from DB template list)
- Object Entry List (of objects that can be added under selected object from conceptual modelisation)

### 2.4.3 Management under Windows 2000, 2000 Server & XP

#### 2.4.3.1 Windowing

The PACIS SCE Application follows windowing behaviour. As presented before it has all option for iconify, maximise/minimise, or close/exit.

When window is minimised it can be resized by its border or corner, and displaced by dragging of title bar. This behaviour is also down with sub windows.

#### 2.4.3.2 ToolTip

When mouse pointer remains on tool bar icon or menu, a tool tip appears with a short message explaining the function.

# USER INTERFACE

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# 1. SCOPE OF THE DOCUMENT

This document is a chapter PACiS SCE (System Configuration Editor) documentation binder. It describes all User Interface or **Human Machine Interface** of this engineering tool.

## 1.1 Using PACiS SCE

PACiS System Configuration Editor is a tool that:

- Helps in definition/**edition of all system data** with its equipment.
- **Generates** each PACiS equipment databases.

At first, the data definition is done by experts through **templates** or models of data. These templates are then stored and delivered in PACiS SCE libraries.

In a second time, the models can be loaded and **instantiated** as a clever kind of duplication to create object data customised to the application case.

In a third time users can makes **modification** on its object database.

When all data of the concrete case are defined, the PACiS SCE generates a coherent set of databases, named **system databag**, which can be loaded into each system equipment by PACiS SMT, the PACiS maintenance tools.

PACiS SCE can export/import **XML files** to/from external tools and generate **reports**.

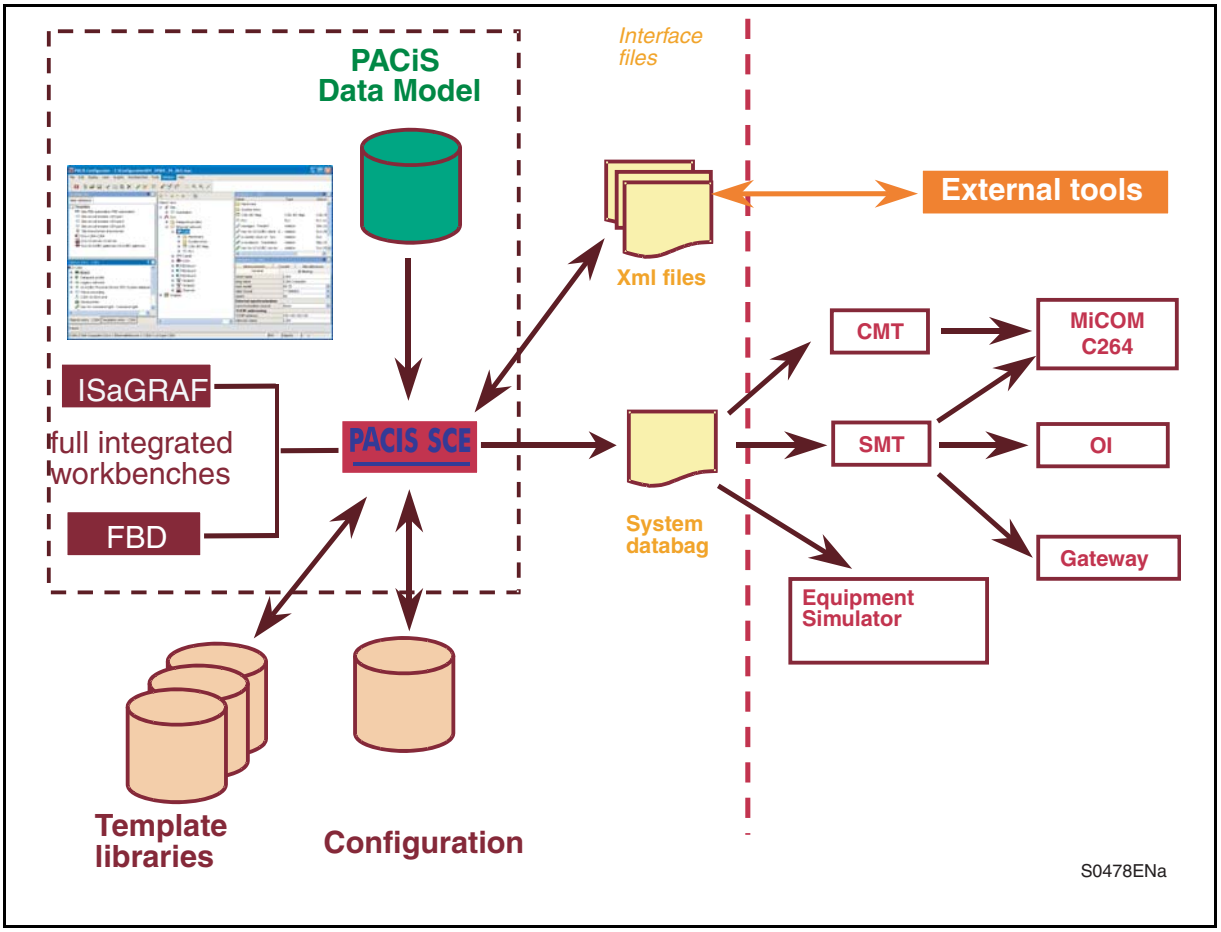



FIGURE 1 - PACiS SCE DATA FLOW

### 1.1.1 PACiS SCE Users

This brief definition of PACiS SCE using shows several kind of user:

- **Expert** template developers who maintain a set of libraries adapted to specified equipment, a protocol mapping, a graphical representation, or an electric automation…
- **Prototypes engineers** who should build quickly the draft of a specific substation with its devices, its main functionality and graphic views, in order to evaluate implementation solutions.
- **Configuration engineers,** who customise, detail and update all structured data of a specified application case, and generate the databases downloaded to the system devices.
- **Maintenance** technicians who need to modify or adjust parameters prior of new database download.

Such categories is only an outline of PACiS SCE users since several of its tools thanks to specific editors, or report managers, can provide the records needed by other tasks: commissioning cubicle, mapping extraction, …

Because of these different users, PACiS SCE has several “levels” in its HMI interface. **This manual describes all of them** whatever could be option or license limitations.

The **projection** of these user categories on PACiS SCE **is not implemented in PACiS V4**.

### 1.1.2 Devices handle by PACiS SCE

PACiS is designed to generate database for PACiS devices:

- **PACiS OI** the Operator Interface
- **PACiS SMT** the System Management Tool that downloads Databases
- **PACiS ES** the Equipment Simulator
- **PACiS GTW** the separate Gateway or Tele control Interface to SCADA
- **MiCOM C264 and C264P**

To generate any equipment database, the PACiS SCE manages:

- Inner data of the device itself (structure and parameters values)
- Exchange data of the device with other system devices
- Exchange data of the device with non system devices

With the 3rd case, the PACiS SCE manages the communication with all **non-PACiS devices** with typically IED or protection devices on Legacy BUS or system network bus. It is only by the configuration of communication mapping that PACiS SCE can handle non-PACiS devices. Anyway, the PACiS SCE does not generate database or setting for these non-PACiS devices.

### 1.1.3 PACiS SCE Components

As most configuration tools, the PACiS SCE is composed of two main software parts with:

- **HMI** (Human Machine Interface) of PACiS SCE and associate tools
- **Data Model** that includes association rules attributes range, and generators.

The aim of this part is the description of Human Machine interfaces. For a full description of the **data model and its use**, refer to **chapters Application** of each PACiS device. Nevertheless, a good understanding of the user interface needs at least the few notions expressed below.

### 1.1.4 PACiS SCE Data hierarchy

First of all, **Data Model** defines structure and structured data. Any piece of information belongs to a **hierarchy** of information often referenced from browsing point of **view as a tree**. This abstraction of data is named **object**.

In PACiS SCE all data belong to only one of the three following tree structures:

- **Electric** process.
- **System** (device characteristics and communication).
- **Graphic** definition of Operator Interface with Archives, Graphic, Printing…

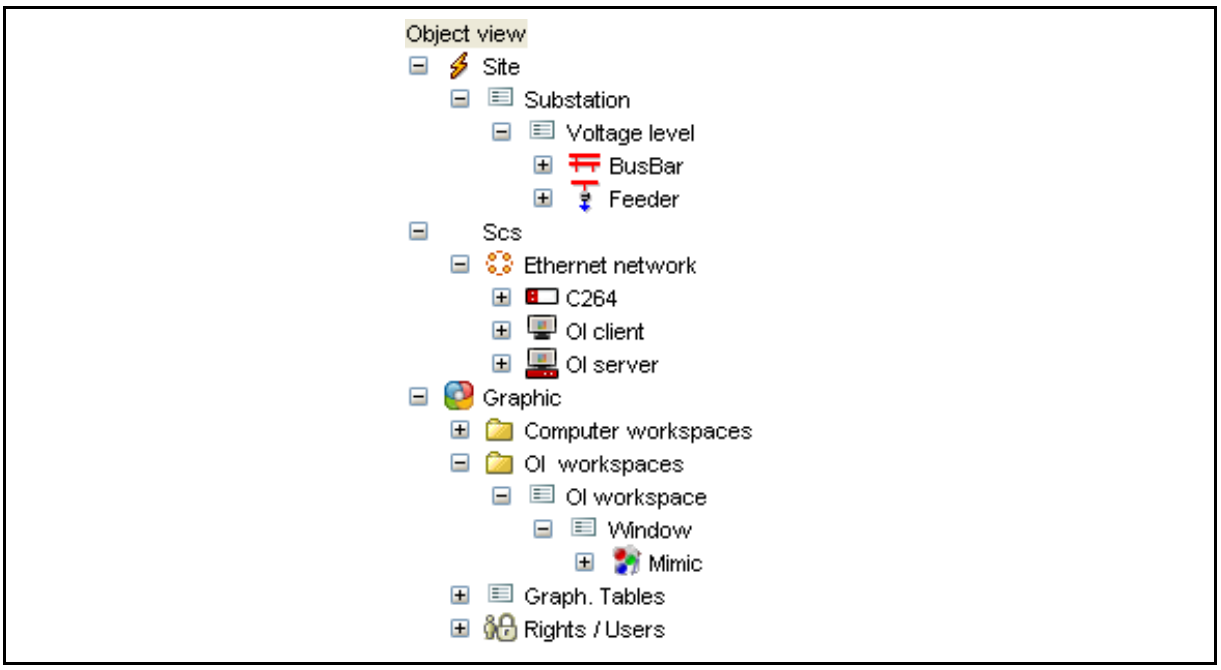



FIGURE 2: PACIS SCE DATA HIERARCHY

In the other hand, the piece of information is structured data, with **list of attributes**. For example, C264 object has a set of configurable attributes like TCP/IP address or network name.

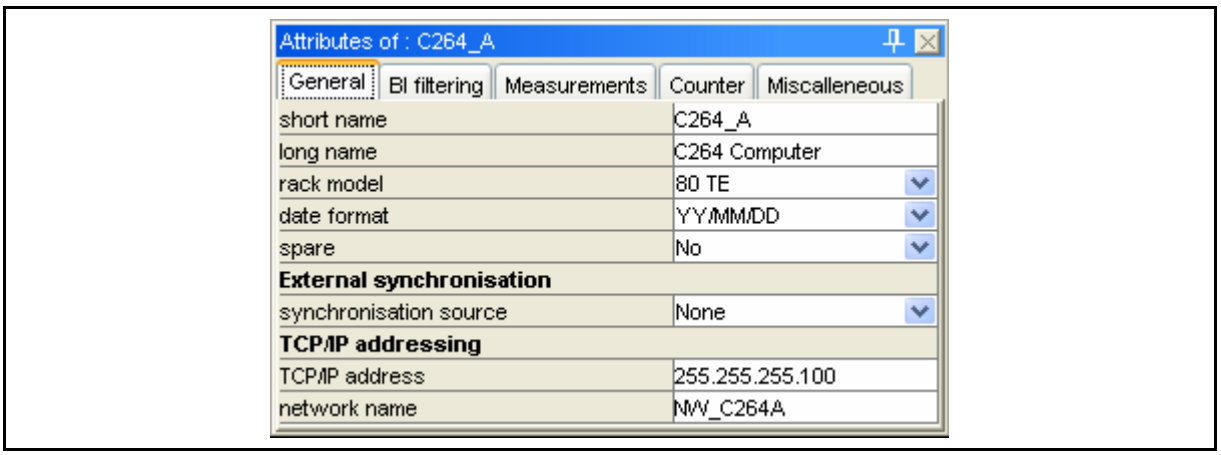



FIGURE 3: ATTRIBUTES OF A C264

### 1.1.5 PACiS SCE Template & Object

All data are defined in data model structure. In PACiS SCE, this notion is fully exploited with the possibility for a **user to create** models called **templates**. Models are duplicated and modified for concrete cases called Object database. This last one is used to generate all PACiS devices databags.

PACiS SCE is then composed of two parts:

- template part,
- object part.

The template part is a list of separate **models** used or not. A model has its own hierarchy data, **with process, system and/or graphic data**.

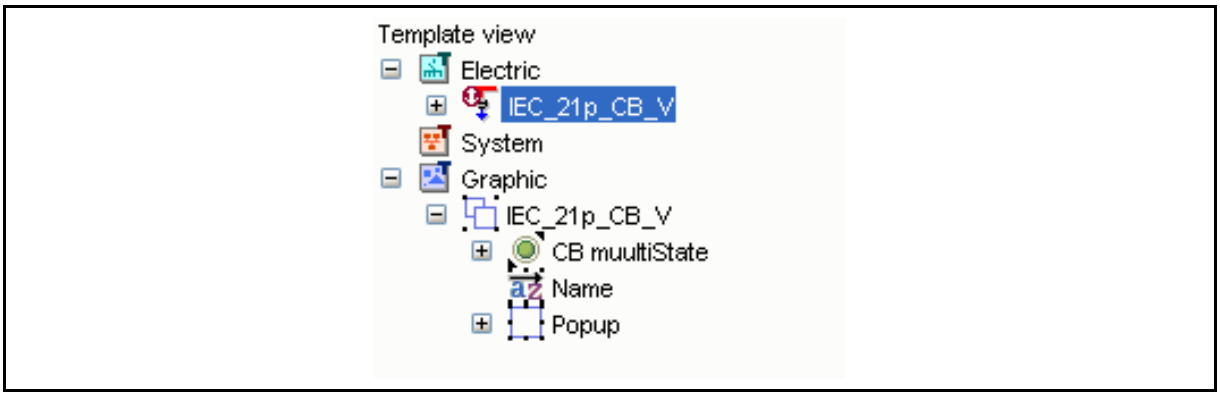



FIGURE 4 - OBJECT MODEL / TEMPLATE

The **template** is used as a model to create new data in object part. The data which come from a template are linked to this template. When template is modified, these **modifications are propagated** to all its **linked objects**.

At any moment, user can switch between Template and Object parts using

Current mode Template or Object is always displayed (right of state Bar).

Access to Template functions is only possible for Level 3 and 4 users.

### 1.1.6 Database creation process

To create the database downloaded to system devices, the common way is to:

1. **Import a template** from an external library into current database (in its template area)
2. **Customise** the template if needed in database template area
3. **Instantiated** the template from template to Object part of the database
4. **Modify** predefined attribute(s) known as degree of freedom (D.O.F), for example the name.
5. **Generate** devices databases

It is recommended to **work as possible with template** and to keep the link between template and instantiated object. Nevertheless, this relation can be broken for deep object modifications. This broken link operation should remain an exception.

During all this creation process, the PACiS SCE makes control in data consistency with its “Data Model”. The checks are made with templates and objects. They are done on:

- Attribute input
- Relation creation
- Generation

NOTE: Use of templates is not mandatory. A database could be configured with no template, directly with objects.

# 2. GENERAL DESCRIPTION

For Installation, please refer to associate document where is define also start settings.

## 2.1 Launching PACiS SCE

As Windows Application, PACiS SCE can be started for example by:

1. Desktop shortcut

2. Windows Explorer selection

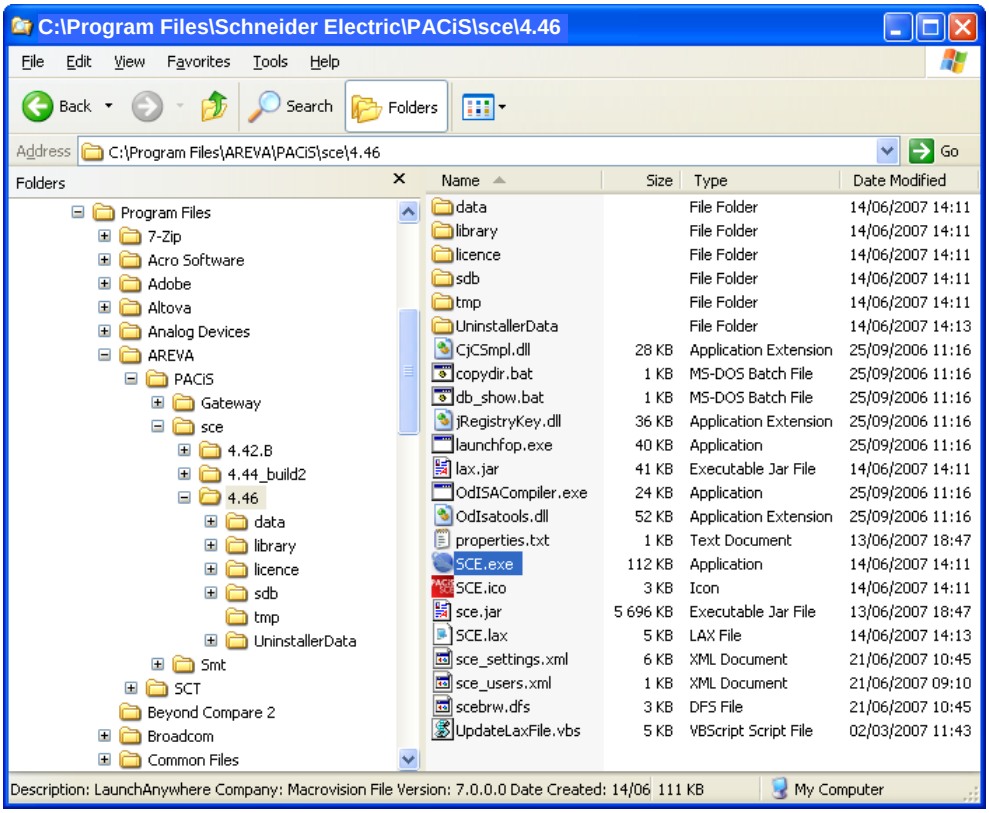



FIGURE 5: EXECUTABLE PATH

3. Start-up/Execute option and typing PACiS SCE

4. Start-up/Program/PACiS/Configuration Editor X.Y/ SCE selection

## 2.2 Leaving PACiS SCE

To stop PACiS SCE use the File/Exit option.

## 2.3 PACiS SCE General Display

At initial start-up or after installation of new version, the PACiS SCE application display can be seen as represented below (as far as user has all PACiS SCE rights and licences). It should be noticed that all parts are not necessary needed for all kind of user.

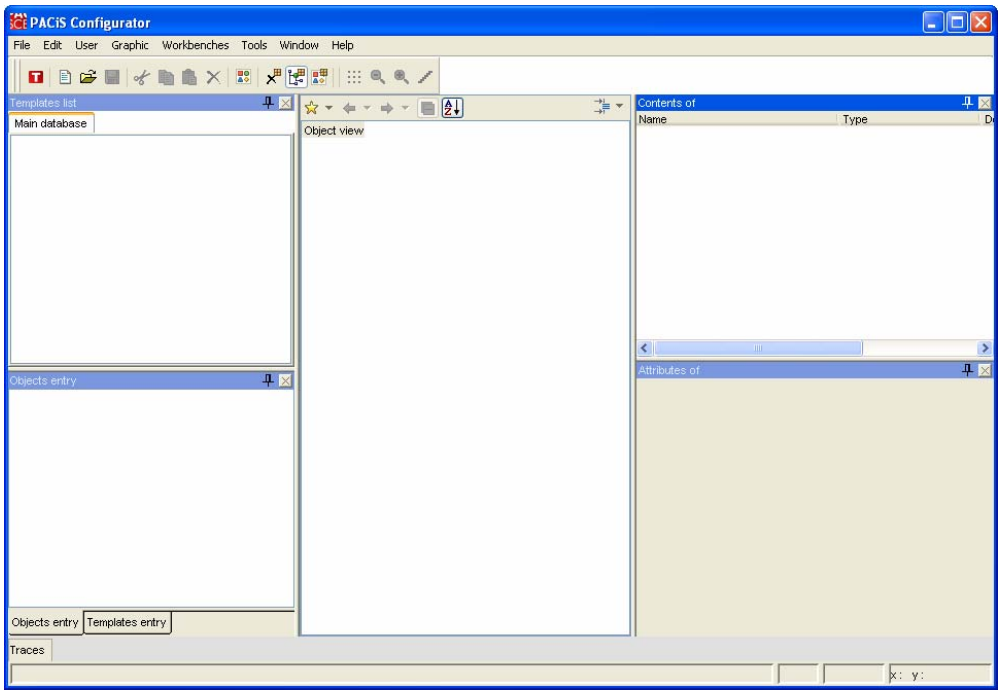



FIGURE 6 - PACiS SCE DISPLAY AT START-UP

The **starting view is empty**. Explanation of each area is given below with some information on it. For displaying information it is needed to load an example or delivered database. This loading explained in detail later is done.

Menu bar: File/Open and classic window search of a database.

After such database load, the PACiS SCE application looks as below.

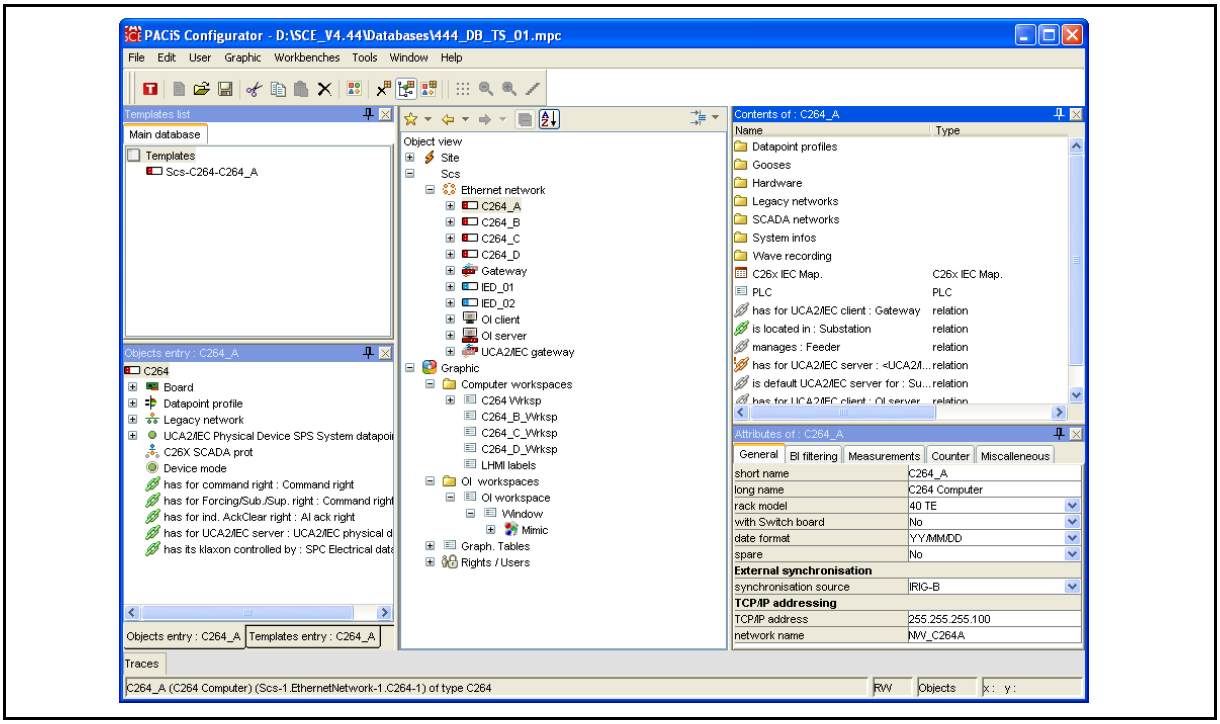



FIGURE 7: PACIS SCE DISPLAY WITH LOADED DATABASE

The display is composed of 5 areas:

- Title Bar
- Menu Bar
- Tool Bar
- Docking Window or common work area composed of several on line optional and customisable areas:
  - Template List Tree Viewer
  - Template Entry Tree Viewer (of selected item in Navigator)
  - Object Entry Tree view (of selected item in Navigator)
  - Template/Object Navigator
  - Object/Template Contents List (of selected item in Navigator)
  - Attributes List (of selected Item in Navigator)
  - Graphic area
  - Traces List Viewer
- Status Bar

### 2.3.1 Title Bar

FIGURE 8: TITLE BAR

This Title bar provides:

- the name of the product **PACiS Configurator** synonym of System Configuration Editor,
- the full file name of the active database (including its path),
- optionally if database is read only.

On the right of title bar are displayed three window standard buttons

Set application as icon in Window Task Bar,

Maximise/minimize application windows

Close/Exit the application.

When the PACiS SCE window is minimised its size remain unchanged, covering fully the screen. Resizing corners and hedges are usually hidden by Windows Application Bars. To resize the minimised PACiS SCE window, it is needed to select the title bar and move it. It is then possible to select window border for a resize operation.

### 2.3.2 Menu Bar

The menu bar is composed of 8 Sub-Menus described in detail in next chapter

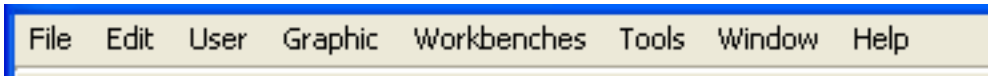



FIGURE 9 - MENU BAR

| | |
|---|---|
| File | All Files operations including generation |
| Edit | All Edition operations |
| User | PACiS SCE access control right management |
| Graphic | All graphical actions (done in Graphic Area) |
| Workbenches | All relations with ISaGRAF and FBD editors |
| Tools | PACiS SCE parameters and internal tools |
| Window | All PACiS SCE work areas management |
| Help | Help index |

### 2.3.3 Tool bars

Three tool bars are available. They could be independently displayed and positioned.

The tool bars display is managed by Menu/Window/Common, OI Mimic and Computer mimic Toolbar.

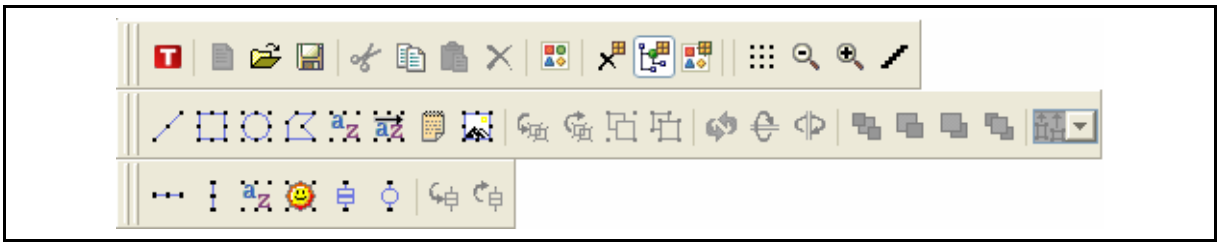


FIGURE 10 - COMMON, OI MIMIC AND COMPUTER MIMICS TOOL BARS

### 2.3.4 Working or Docking Window

By default, the working area is displayed with all areas as below.

Areas are viewers driven by:

- **Navigator** perspective Tree Viewer: presents a hierarchical view of the configuration. Three roots are defined: electric (Site), system (Scs) and graphic. Its behaviour is the same than the left part of a window explorer.

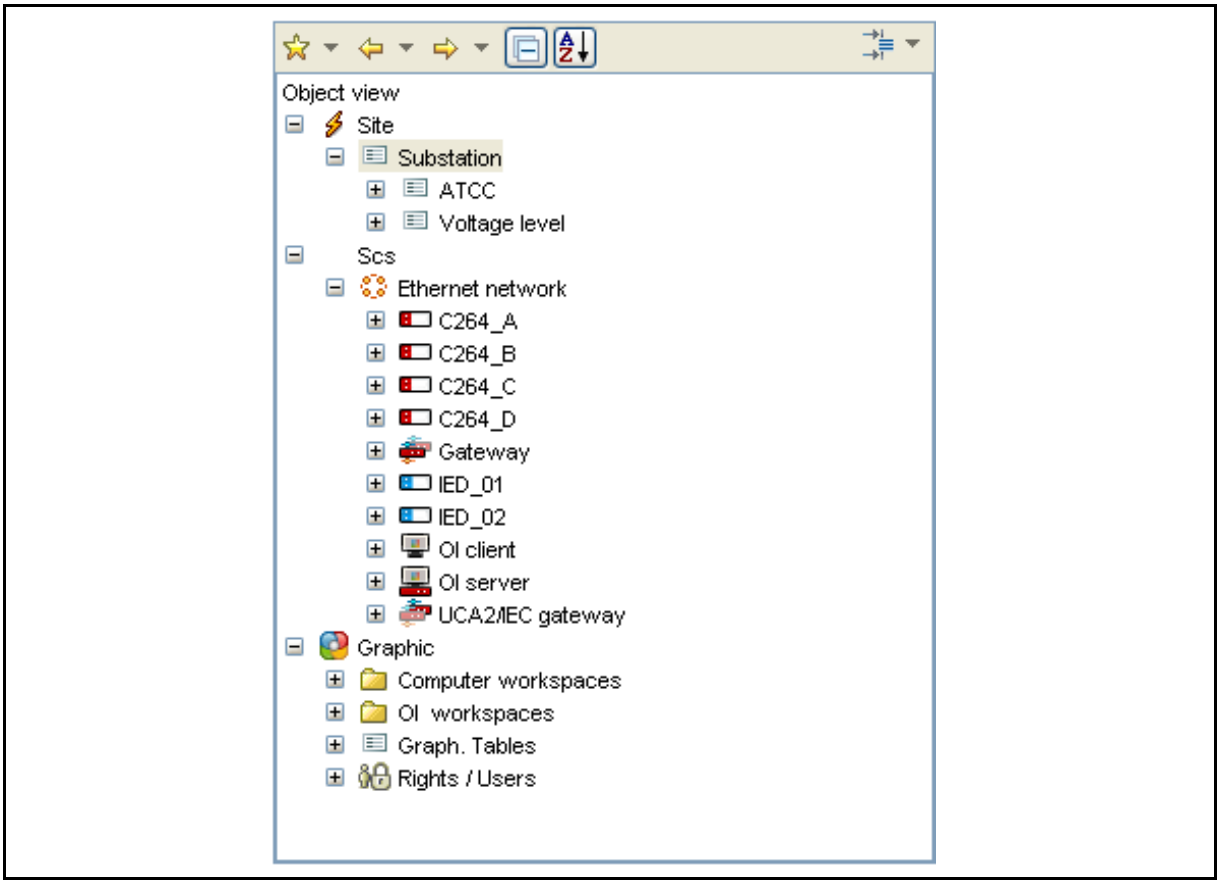



FIGURE 11: - NAVIGATOR

- **OI Mimic Editor**: this editor is displayed in the graphic area and is used to edit the OI mimics.

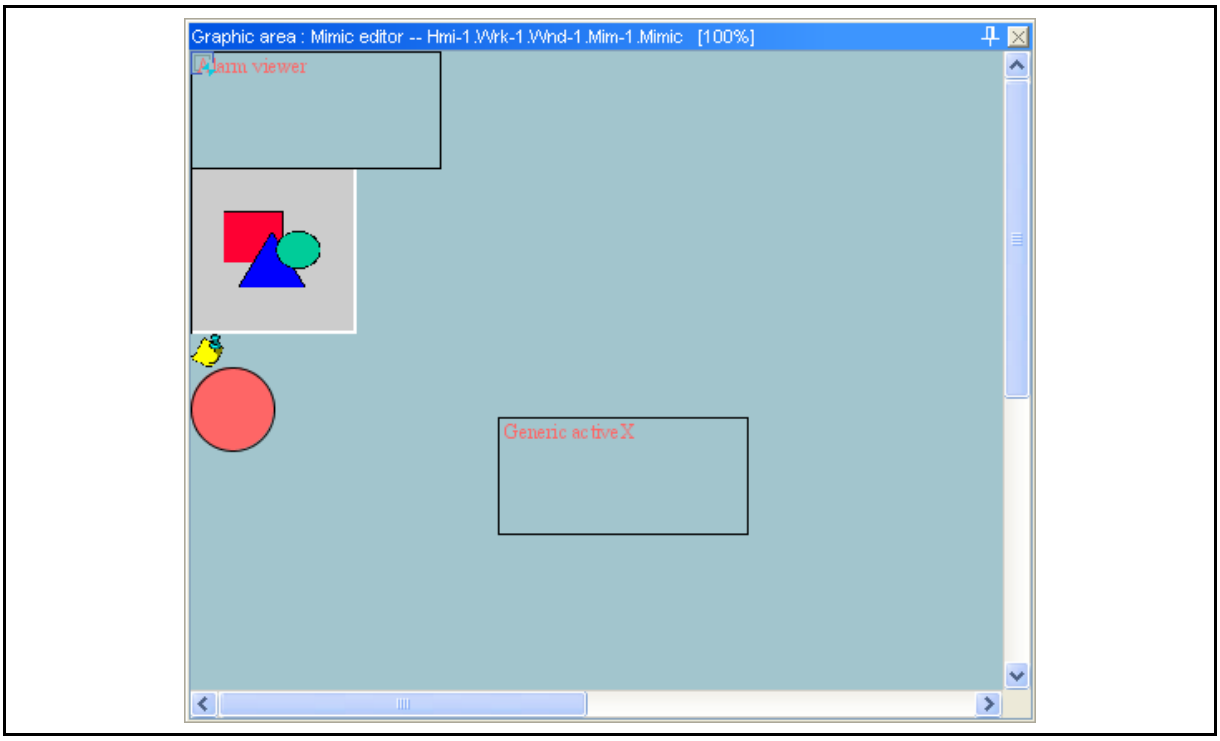



FIGURE 12: OI MIMIC EDITOR

- **Computer Mimic Editor**: this editor is displayed in the graphic area and is used to edit the bay mimic of C264 HMI.

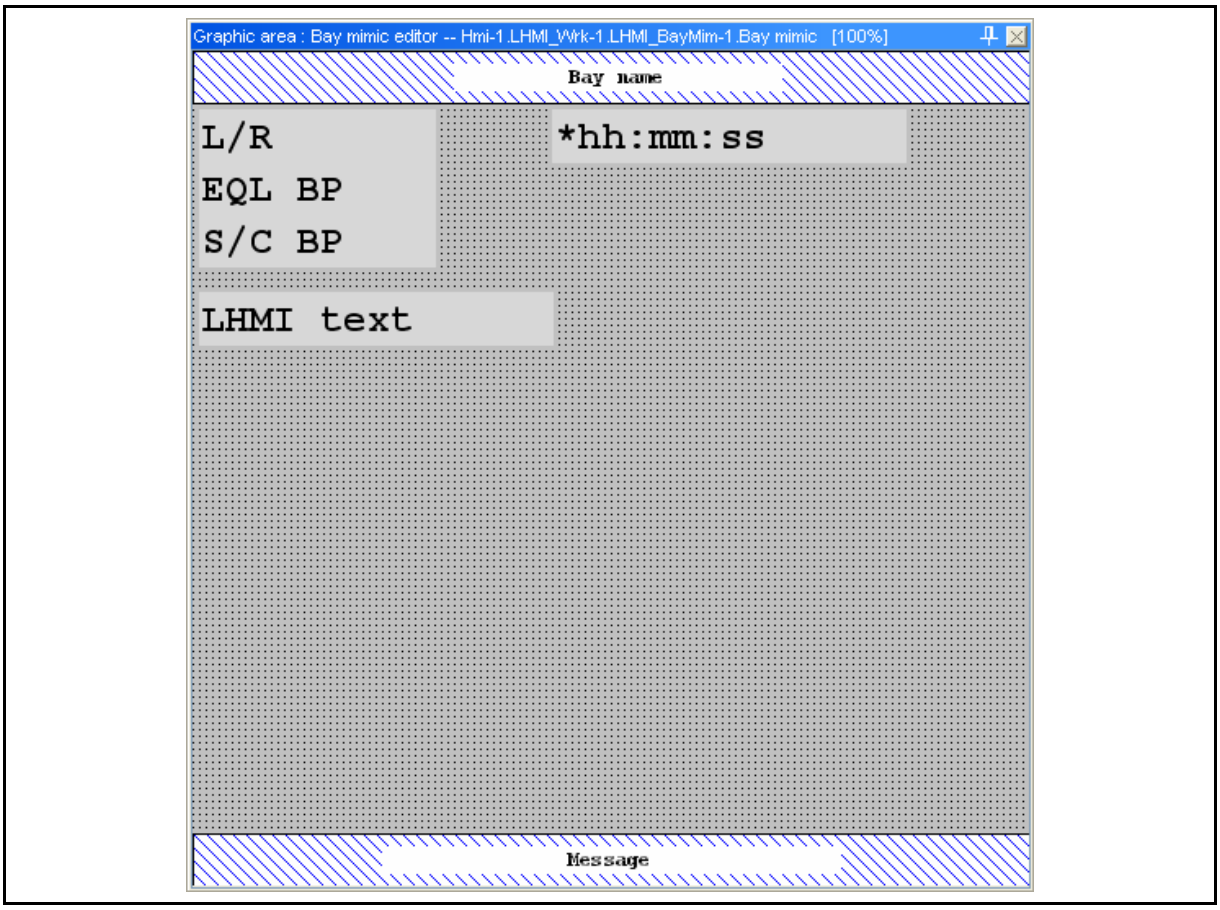



FIGURE 13: COMPUTER MIMIC EDITOR

- **Bitmap Editor**: this editor is displayed in the graphic area and allows editing the bitmap file which is used during Computer mimic edition. The bitmaps are stored in a bitmap table.

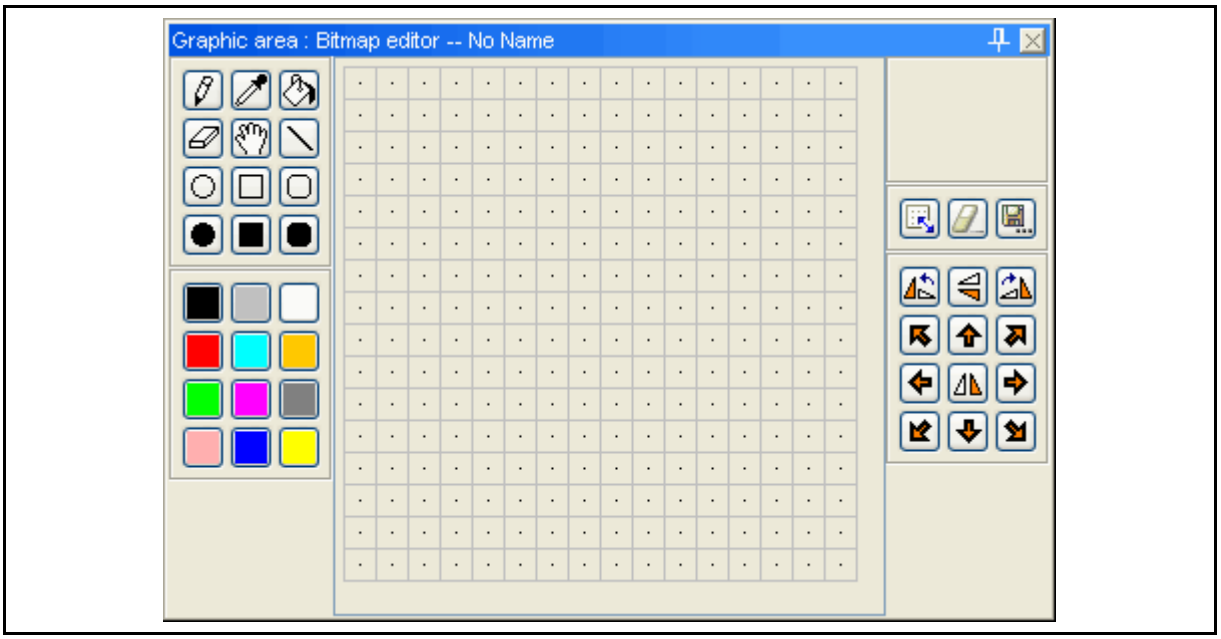



FIGURE 14 - BITMAP EDITOR

- **Template navigator**: presents the list of all templates defined in the current configuration database.

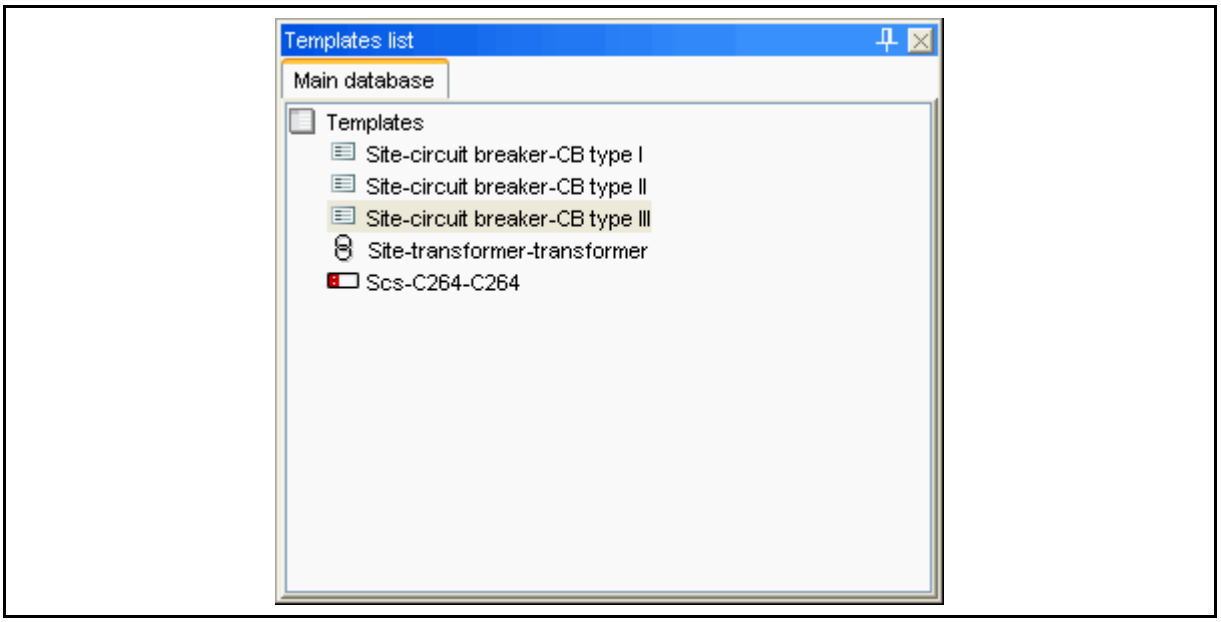



FIGURE 15 - TEMPLATE LIST

When selecting object (click, enter) all viewers are “refreshed” with corresponding data:

- **Template Entry List**: views the existing templates which can be added under the selected object.

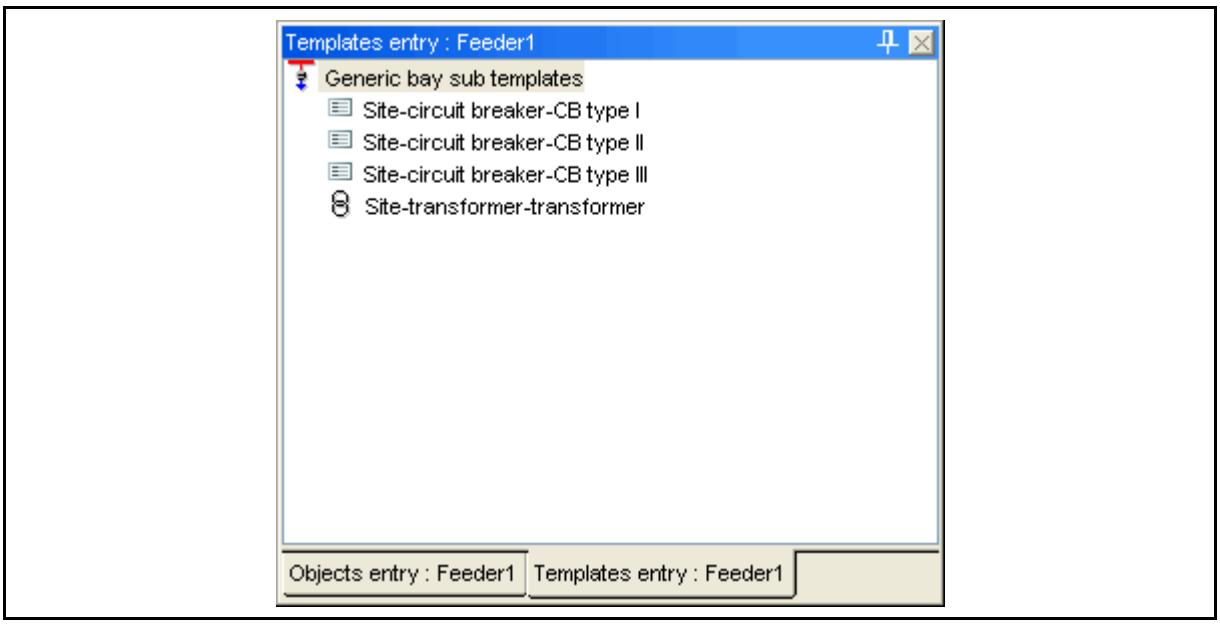



FIGURE 16 - TEMPLATE ENTRY LIST

- **Object Entry List**: displays the list of objects which can be added under the selected object. This list is presented in a tree view: for example: all boards which can be added under a C264 are presented under a folder named Board. The content of this view depends on existing objects under the selected object: if the maximum number of cards with a specific type is reached, this kind of card is deleted from this helper view.

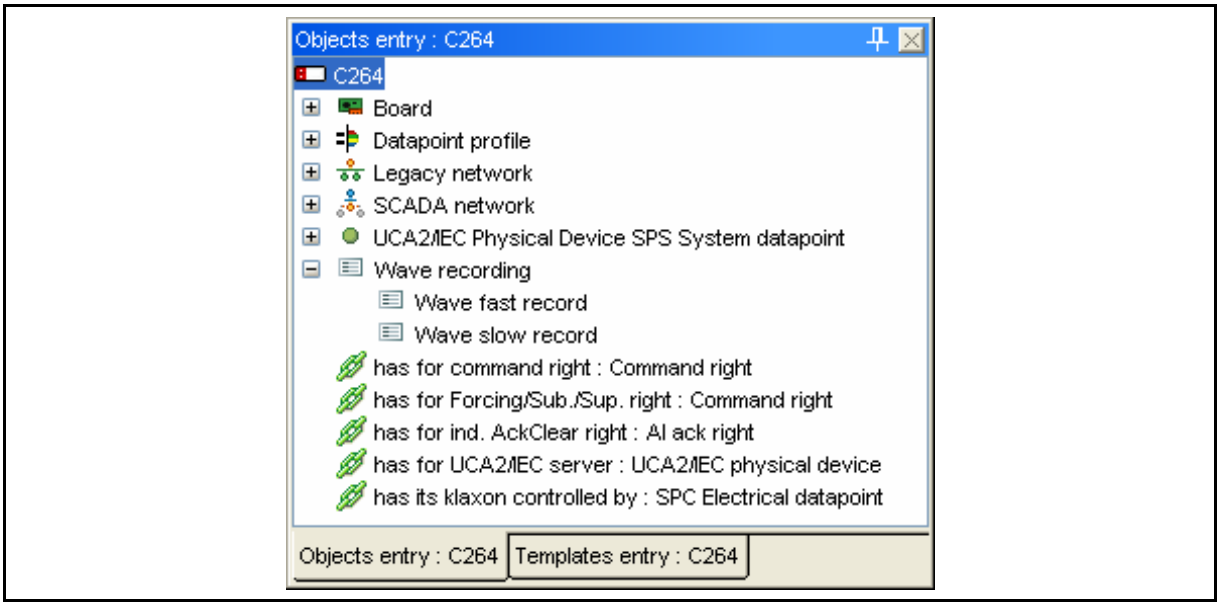

Objects entry : C264
C264
Board
Datapoint profile
Legacy network
SCADA network
UCA2/IEC Physical Device SPS System datapoint
Wave recording
Wave fast record
Wave slow record
has for command right : Command right
has for Forcing/Sub./Sup. right : Command right
has for ind. AckClear right : AI ack right
has for UCA2/IEC server : UCA2/IEC physical device
has its klaxon controlled by : SPC Electrical datapoint
Objects entry : C264
Templates entry : C264

FIGURE 17: OBJECT ENTRY WINDOW ASSOCIATED TO A COMPUTER

- **Components List**: objects/relations under selected object. Its behaviour is the same than the right part of a window explorer.

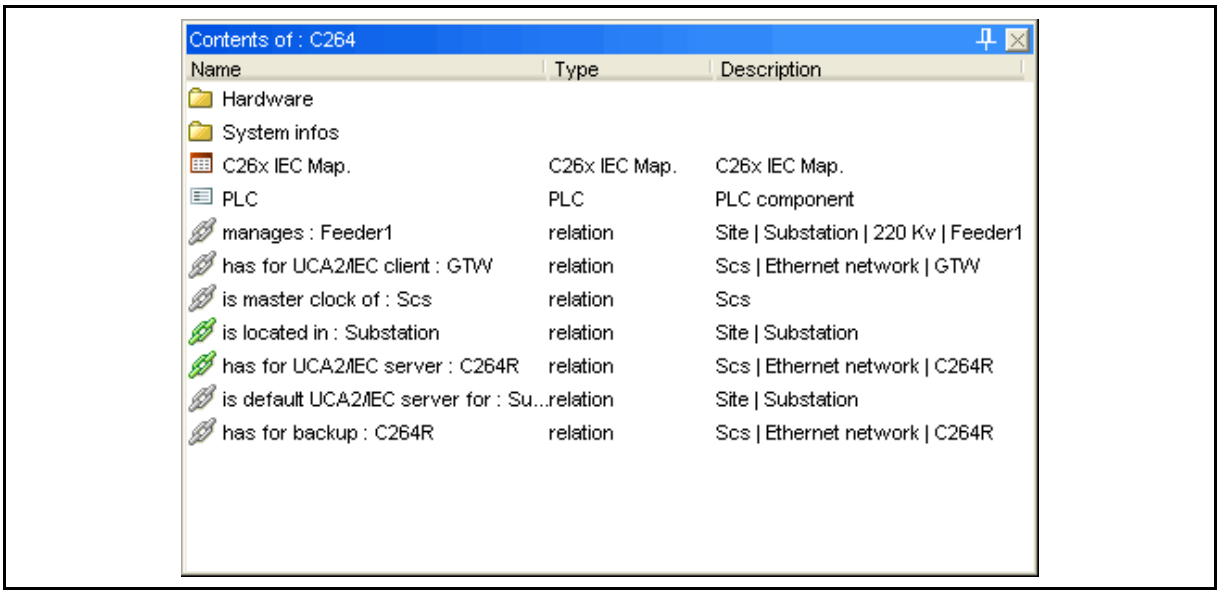



FIGURE 18 - COMPONENTS LIST

- **Attributes List**: the configurable attributes of the selected object.

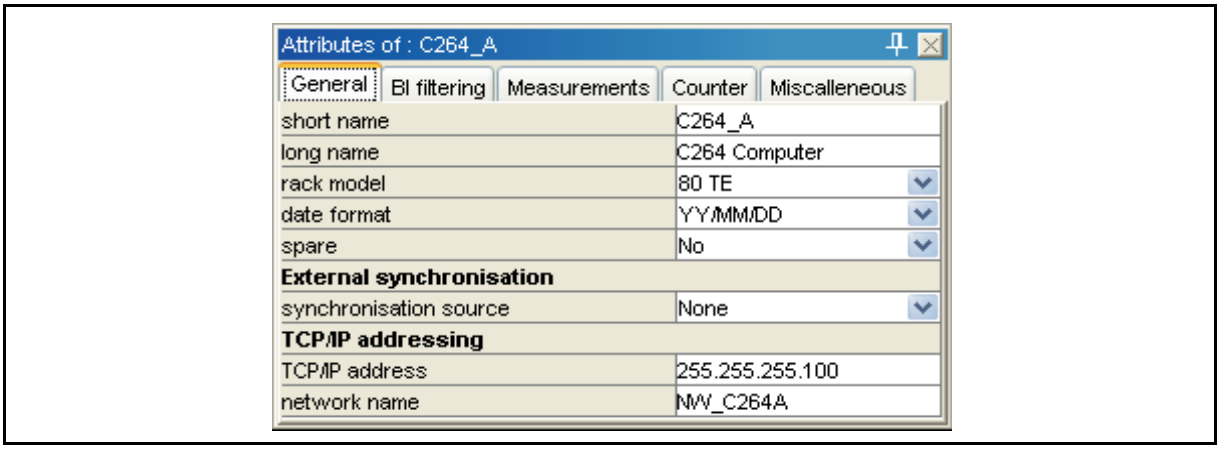



FIGURE 19: ATTRIBUTES OF AN OBJECT

2.3.5 Status Bar

At the bottom of the screen, is displayed a set of information relative to PACiS SCE Application run time messages.

FIGURE 20 - STATE BAR

With 4 contextual labels from left to right:

1. PACiS SCE Application run time message or selected Object/Template name and type.
2. Read/Write property of the object.
3. Object / Template mode.
4. Coordinates of cursor in the OI or Computer Mimic editor.

## 2.4 Management under Windows 2000 & XP

2.4.1 Windowing

The PACiS SCE Application follows windowing behaviour. As presented before it has all option to set as an icon, maximise/minimise, or close/exit.

Each internal window (included tool bar) is managed with the following dock/float window features:

- dock window anywhere,
- window can be fixed in the screen,
- change dock/float states by double clicking,
- window can be either attached to or detached from the tabbed components,
- save and load dock/float states when user exits and enters in the PACiS SCE Application.

When window is minimised it can be resized by its border or corner, and displaced by dragging of title bar. This behaviour is also down with sub windows.

2.4.2 ToolTip

When mouse pointer remains on tool bar icon or menu, a tool tip appears with a short message explaining the function.

# 3. PACiS SCE DETAILED WINDOWS DESCRIPTION

## 3.1 Tools Bar

The tool bar can have separate groups of tools displayed by Menu/Windows/Tools option. The associated functions are detailed in following chapter.

### 3.1.1 Common Tools

Set of statistically most commonly used control (also defined in menu bar)

FIGURE 21 - COMMON TOOL BAR

| | |
|---|---|
| | Switch between Template and Object Mode |
| | New File Database or Library |
| | Open Database or Library |
| | Save current File (Database or Library) |
| | Cut Selected Object/Template |
| | Copy Selected Object/Template |
| | Paste/Duplicate Selected Object/Template |
| | Delete Selected Object/Template |
| | Add Mimic Editor Area into Dock window |
| | Reset the default perspective of Dock / Float windows |
| | Switch Dock window focus on Navigator Perspective |
| | Switch Dock window focus on Graphical Perspective |
| | Show/Hide the grid |
| | Zoom + |
| | Zoom - |
| | Anti-aliasing effect |

### 3.1.2 OI Mimic Tools

Set of statistically most commonly used graphic control (also defined in menu bar) for OI Mimic graphical editor.

FIGURE 22 - OI MIMIC GRAPHICAL EDITOR TOOL BAR

| | |
|---|---|
| | Create a line |
| | Create a rectangle |
| | Create a circle |
| | Create a polyline |
| | Create a text |
| | Create a variable text |
| | Create a memo icon |
| | Create an image |
| | Group edition |
| | Exit group edition |
| | Group Selected Graphic Objects |
| | Ungroup Graphic group object |
| | Rotation 90° |
| | Flip |
| | Mirror |
| | Graphic Object at Bottom plane |
| | Graphic Object at Backward plane |
| | Graphic Object at Forward plane |
| | Graphic Object at Top plane |
| | Scrolling list of alignment functions<br>Scrolling control<br>Align Horizontal Top<br>Align Horizontal Centre<br>Align Horizontal Bottom<br>Align Horizontal Side by Side<br>Align Vertical Left<br>Align Vertical Centre<br>Align Vertical Right<br>Align Vertical Side by Side |

### 3.1.3 Computer Mimic Tools

Set of statistically most commonly used graphic control (also defined in menu bar) for Computer Mimic graphical editor.

FIGURE 23 - MICOM C264 MIMIC EDITOR TOOL BAR

| | |
|---|---|
|  | Create an horizontal line |
| | Create a vertical line |
| | Create a text |
| | Insert a bitmap |
| | Create a module |
| | Create a transformer module |
| | Module edition |
| | Exit module edition |

## 3.2 Docking Window

### 3.2.1 Docking Window Management

The main working area uses a display principle called **docking**. It is made for **flexible** management of several sub-areas.

- inserted with dependency in the docking window or
- separate window.

A docked area supports any kind of editor: tree browser, list, graphic, As window sub-object, area can be **resized** by its edge, **moved** by its title bar, or **closed** by the cross on upper right corner.

When the docked area is a **separate window**, it is handled like any window and can be dragged to separate screen display (when PC has multiple screens), or on extended virtual desktop part. The separated window remains over its father PACiS SCE application window, like a more known pop-up. This window can not be set in icon.

When the docked area **remains in dock window**, its size is adjusted to other docked area and especially a main docked area. The main docked area is selected in the Window Menu. It is proposed the object/template **navigator perspective** or the **graphical area perspective** which supports all graphical editors. All other docked areas are automatically adjusted from this first area.

An area could be **pinned or not**: if it is pinned, its view is permanent, if it is not pinned; the area is displayed only when the mouse points on it.

An area could be attached to or detached from the **tabbed components**: several areas are displayed on the same window, the user works on each area through its tab button.

### 3.2.2 Selecting displayed area in working window

The menu bar in sub menu Windows helps to select or deselect the areas seen in working window area. When an item is clicked, a tilde appears before all activated area. Another click deselects the given area from the working window area.

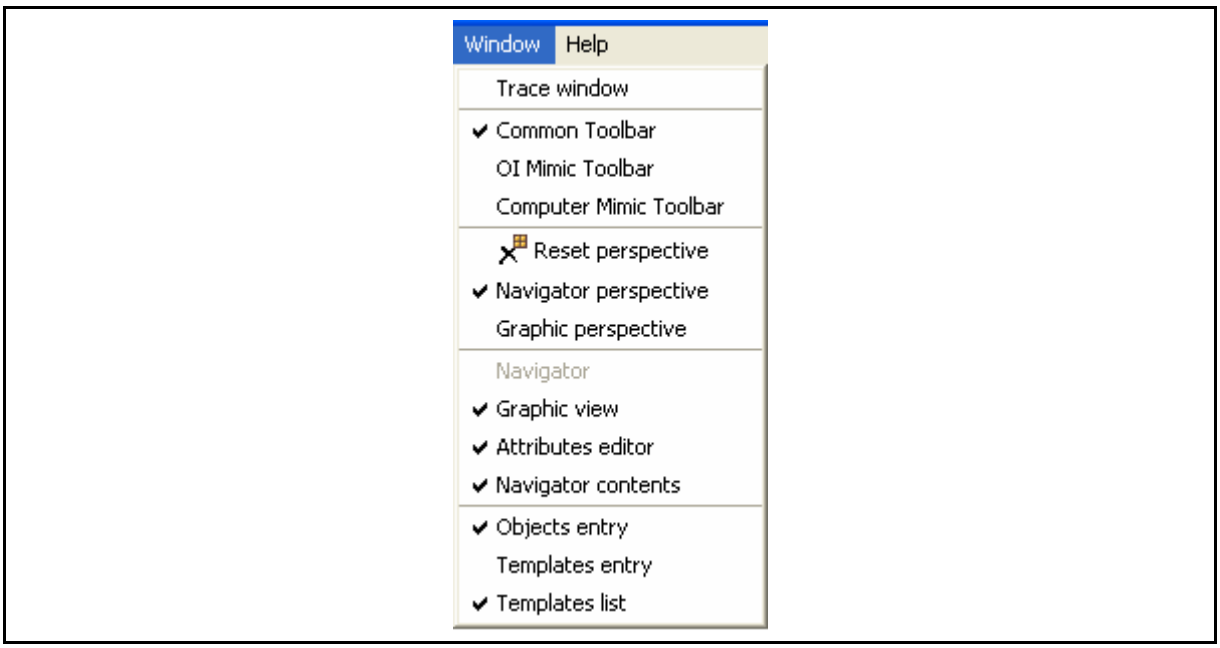



FIGURE 24 - AVAILABLE AREAS

Area unselecting can be done also by a click on its cross on upper right corner, except for the main area (navigator or graphic editor).

### 3.2.3 Moving/placing areas into working window area

The size of the PACiS SCE application determines the size of its inner docking windows.

Most of the time, PACiS SCE window is maximised. When new docking areas are added by menu bar, they are displayed as “docked”, in the docking window, at default location. Then all docked areas are resized.

Working with PACiS SCE, a user may need to:

- resize docked area or
- modify docked position relatively one to others.

**To resize** docked area without changing disposition of areas, a mouse click on border or edge allows a resizing of this area in horizontal or vertical direction. As docking window size is then fixed, other docked areas are then resized in same directions.

**To modify** the area disposition or how they are placed relatively one to the other, the user has to click on one area header. Since a rectangle appears. While still right mouse pressed, the rectangle representing area can be dragged. This control rectangle can change in shape or colour.

If mouse pointer is released when control rectangle is still blue, the moved area while be dropped in docking window. If the key is release when rectangle is grey, the moved area becomes a moveable window out of dock window and PACiS SCE main window.

If control rectangle is blue and dragged to the boundary of docked area it changes its shape. New shape is still rectangle but different sizing, square, flat vertical or flat horizontal. The new shape in blue is a “proposal” new positioning of the moved area into the docking window, relatively to other docked areas. A key release drops then the moved area in new relative position in docking window.

It is possible at any moment to get back the default configuration of windows by select **Reset Perspective item** in Window menu.

### 3.3 Navigator

It is the main window to select template/object. It is the central area in docking window management (like also graphic area) when Navigator Perspective (Windows menu) has been chosen. This area should not then become a stand-alone window.

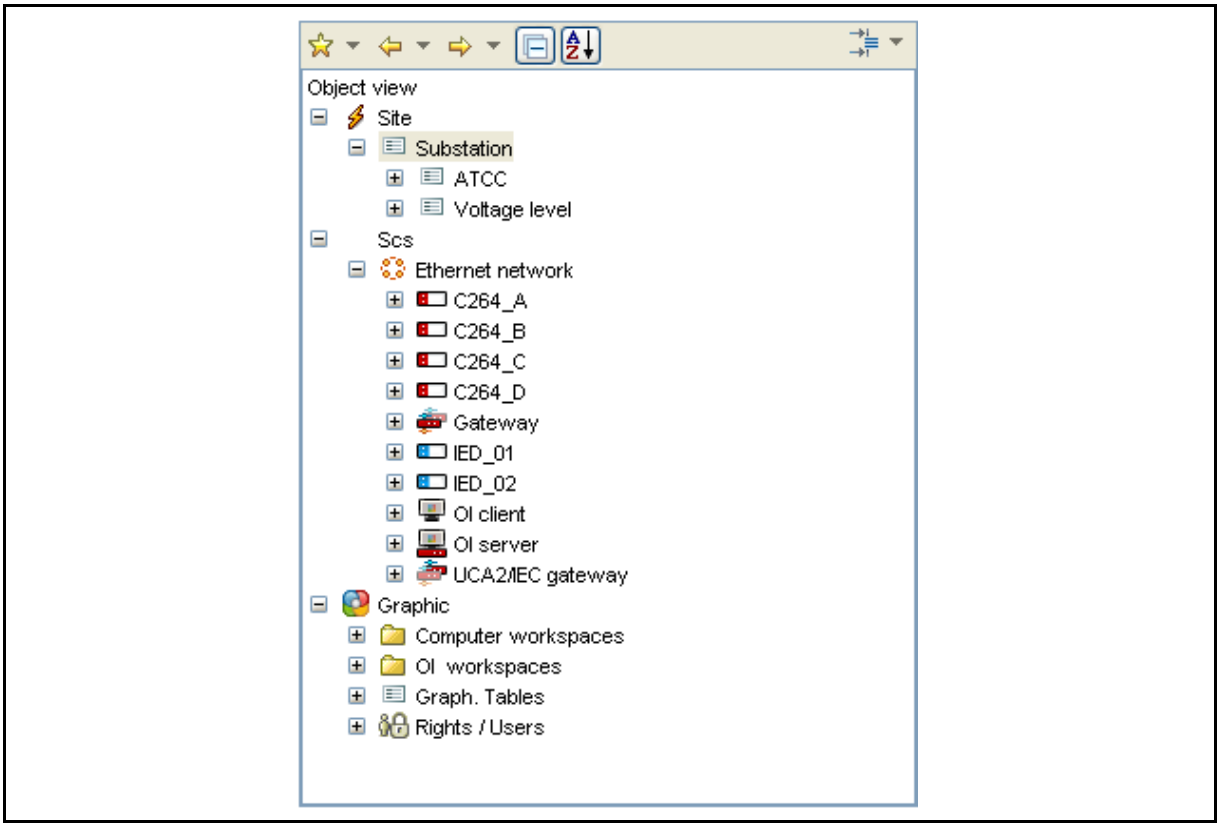


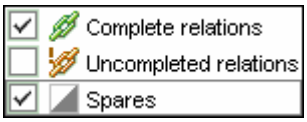

FIGURE 25: NAVIGATOR PERSPECTIVE

In any case the main interest is on the selected object (here the object **Substation** is in grey background). All other docked area refers to this object.

The navigator has a panel on its top which allows to browse into the list of the last visited objects.

There are seven buttons which have the following functions:

| | |
|---|---|
| | Favourite: reaches to the favourite object, if it is defined. The combo list allows to visualise the path of the favourite object and to set a new one. |
| | Back: reaches to the previous selected object, if it is defined. The combo list allows to visualise the complete list of the previous visited objects and to select one of them. |
| | Forward: reaches to the next selected object, if it is defined. The combo list allows to visualise the complete list of the next visited objects and to select one of them. |
| | Collapse sub tree: collapses the current selected object and all components of this object. Allow to free memory used by its components. |
| | Sort: sorts all short names of the children components of the selected object with **alphabetic order**. |
| | This button is used to toggle the last check box (among the three described here after) which has been accessed by the user. |

| | |
|---|---|
| | When this button is clicked the following submenu is displayed<br>  <br><br>The first check box is used to show (when selected) or hide ( when unselected) the complete relations<br>The second check box is used to show (when selected) or hide ( when unselected) the uncompleted relations<br>The third check box is used to show (when selected) or hide ( when unselected) the spare objects or spare templates. |

Theses buttons are used in all tree representations of PACiS SCE; with the same behaviour. This behaviour is not re-defined elsewhere in this document.

The navigator is a standard tree viewer allowing with + and – to expand, reduce browsing of object components.

Icon indicates properties of objects.

They are different in template or object mode.

| Icons | Database | Properties |
|---|---|---|
| | Template | Main Electric Parent |
| | Template | Main System Parent |
| | Template | Main Graphic Parent |
| | Both | Configurable component |
| | Both | Folder or Binder |
| | Both | Template Anchor (Parameter) |
| | Both | Template Instance Anchor (Parameter) |
| | Both | Template root |
| | Both | Complete or Full Filled Relation |
| | Both | Incomplete Relation |
| | Both | Complete and Fixed Relation |

Relation representation is defined via toggle buttons, and . Theses buttons allows to filter or to display relations on navigator.

A double click on an object expands it.

In navigator and content window, the labels of **Spare** objects are *greyed and italic*. For sparing an object, set the Object **attribute** spare to Yes.

### 3.4 Components List

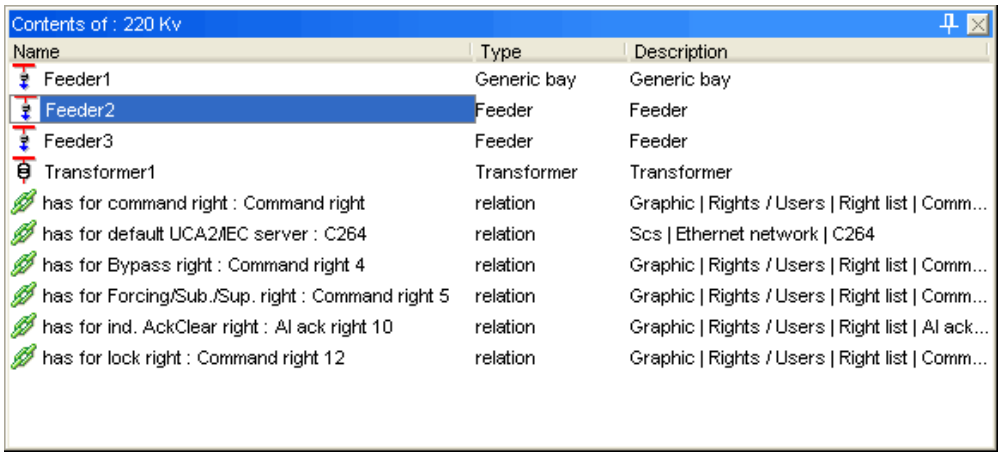



FIGURE 26 - COMPONENTS LIST VIEWER

The components list gives the same sub-object that navigator expands. But it provides two other columns with the object type, and object description.

Sorting can be made by Name, Type or Description by clicking on header.

Relations, content drawings are the same that navigator, with same visibility rules. The behaviour of mouse operation is the same. A click on an object changes focus. A double click on a relation opens the **Relation link editor** dialog box..

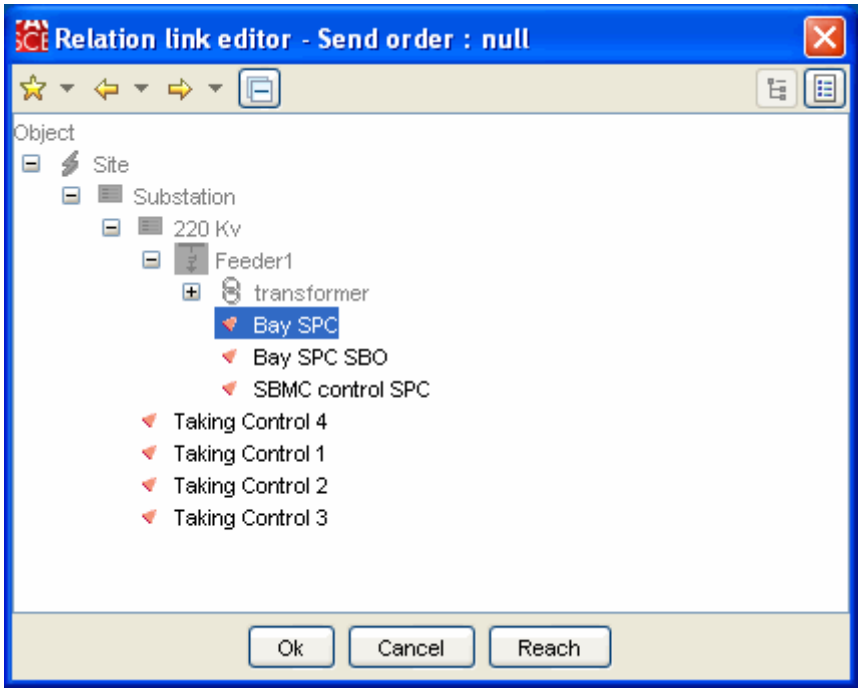



FIGURE 27 - RELATION LINK EDITOR

### 3.5 Attributes List Editor of Object/Template

**Attributes** are displayed in the editor as a table. Attributes are organised in **categories** (different tables with tabs) and **sub-categories** (different separators within a table).

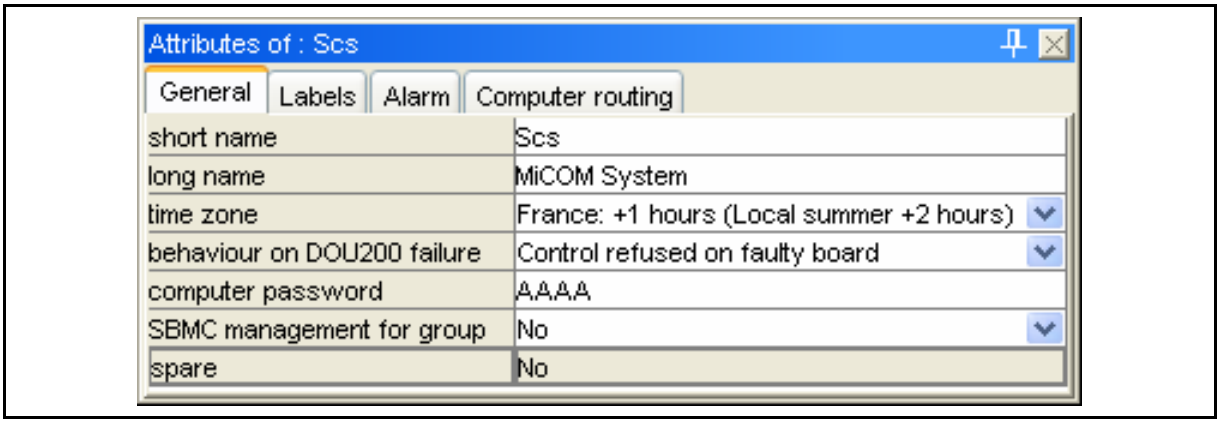



FIGURE 28: ATTRIBUTES LIST EDITOR

**Relation attributes** are displayed as normal attributes in a tab Relation. The path of linked object is also displayed as an attribute in a category Relation. If the relation is filled (i.e. the link is defined), the attributes of linked object are also displayed and editable while the relation edition. This allows to minimize **the navigation between objects**.

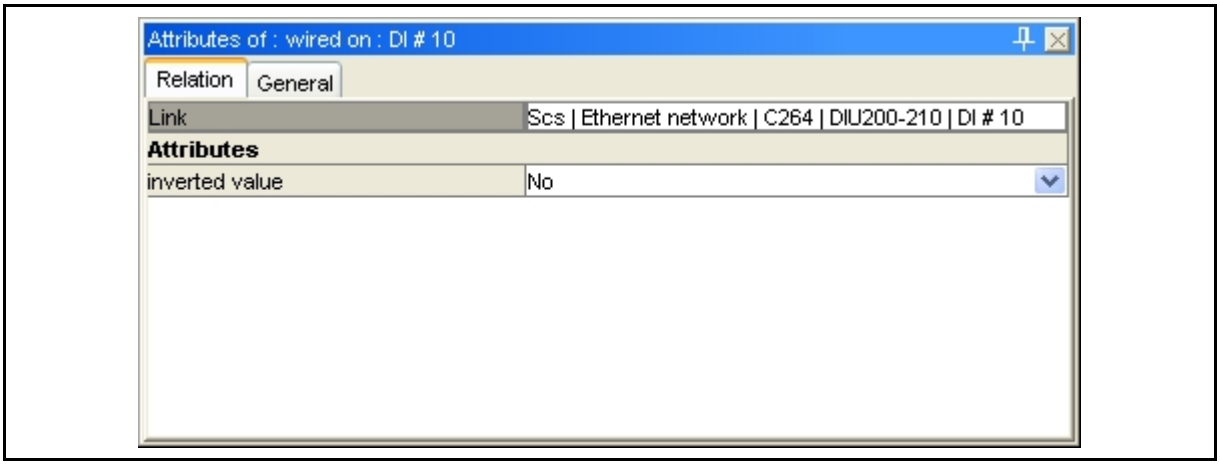



FIGURE 29 - RELATION ATTRIBUTES LIST EDITOR

If the relation is filled (i.e. the link is defined), the attributes of linked object are also displayed and editable while the relation edition. This allows to **minimize the navigation between objects**.

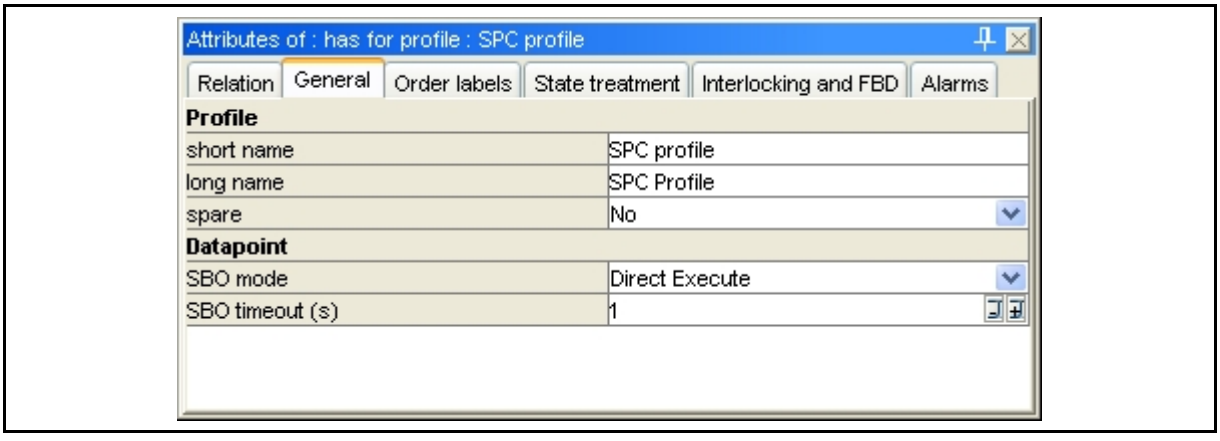



FIGURE 30 - RELATION ATTRIBUTES OF LINKED OBJECT

Attribute value modification is done by selecting a value in a list, or by double-clicking in the field to edit.

The **value representation** is different for:

- Attribute **not linked to a template**:
  - Read/write: white,
  - Read-only: greyed.
- Attribute **linked to a template**:
  - Read/write: white, its short name font colour is blue in the template mode,
  - Read-only: greyed.

**Parameters** are displayed as attributes in the Parameter category.

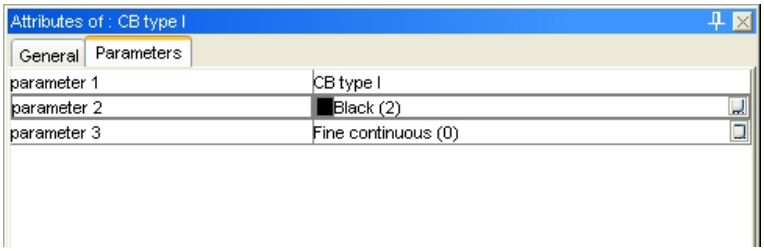



FIGURE 31 - PARAMETERS LIST EDITOR

The **contextual menus**, available with a right click, are:

- Cut: initiate the Cut action
- Copy: initiate the Copy action
- Paste: initiate the Paste action
- View linked attributes

## 3.6 Database Entries

The Database entry is composed of three areas whose purposes are different in the cases listed below.

### 3.6.1 Templates list

The **Templates list** contains all templates that are in the opened database(s).

The **main database** is the first opened database. It can be opened in update mode (work version) or read-only mode (referenced version).

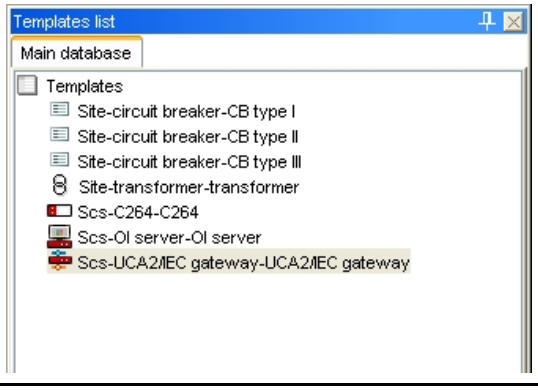



FIGURE 32 - TEMPLATE LIST AREA

The **second database** is the second opened database. It is mandatory opened in read-only mode. The System allows to open the second database only if the main database is opened in update mode.

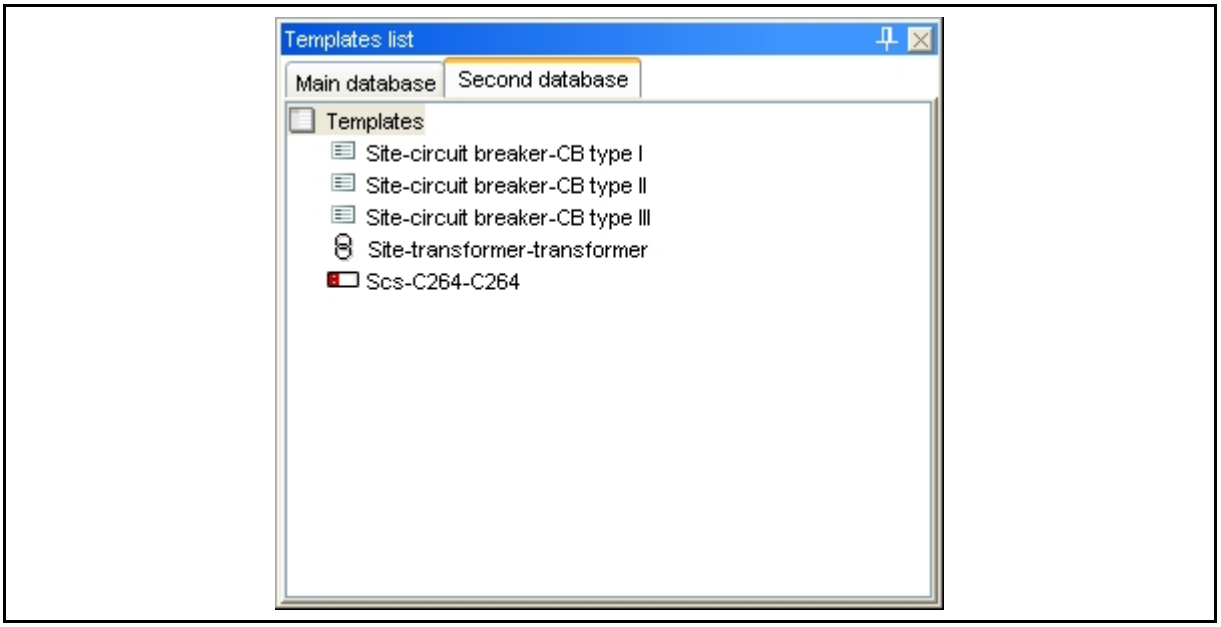



FIGURE 33 - TEMPLATE LIST AREA WITH A SECOND OPENED DATABASE

These templates are split in two tabbed panes, one for main database, and other for second database. If only main database is opened, the second tabbed pane is not visible. The tabbed panes have a ToolTip which give the name of opened database.

The Templates list and Templates entry are defined as a flat list of templates. The list root is specialised for the Templates Lists and the Templates entry (contains the type of the object/template selected in the Navigator).

The list is organised as follows:

- Electrical, then System, then Graphical templates.
- Alphabetical order on Anchor template type.
- Alphabetical order on Anchor template short name.

The list root ToolTip contains the name of the corresponding database (main database in Main Template List, second database in Second Template List).

This area is used to:

- Select a template to edit, in template mode,
- Transfer a template from second database to the main database: the template must be selected from second database templates list. On this template a contextual menu Add allows to copy this template to the main database. The template is then added into main database templates list.

### 3.6.2 Templates entry

The **Templates entry** contains the templates that can be added as a child of the selected element in the Navigator. It is therefore a contextual area.

A contextual menu item allows to add the current template under the current selected object from the navigator.

Hereafter, an example of a templates entry area.

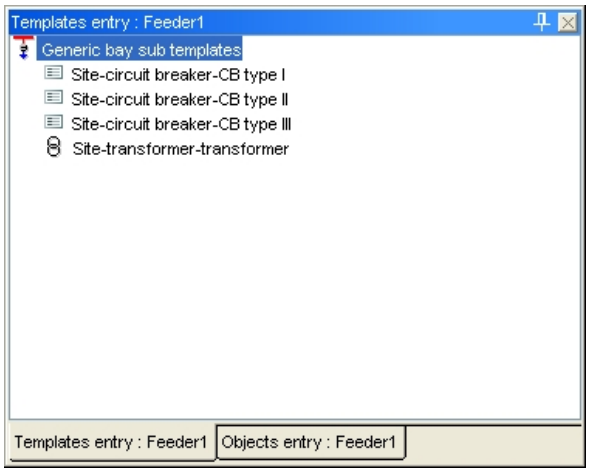



FIGURE 34 - TEMPLATE ENTRY AREA

It represents all templates which can be added under a voltage level. This voltage level is the selected object in the Navigator view.

### 3.6.3 Objects entry

The Objects entry contains the types (objects/templates and relations) that can be added as a child of the selected element in the Navigator. It is therefore a contextual area. These types are displayed as a tree, and organised with abstract types.

A contextual menu item allows to create an object with the selected type under the current selected object from the navigator.

Hereafter, an example of an objects entry area for a voltage level objects. It represents all objects which can be added under a voltage level. This voltage level is the selected object in the Navigator view.

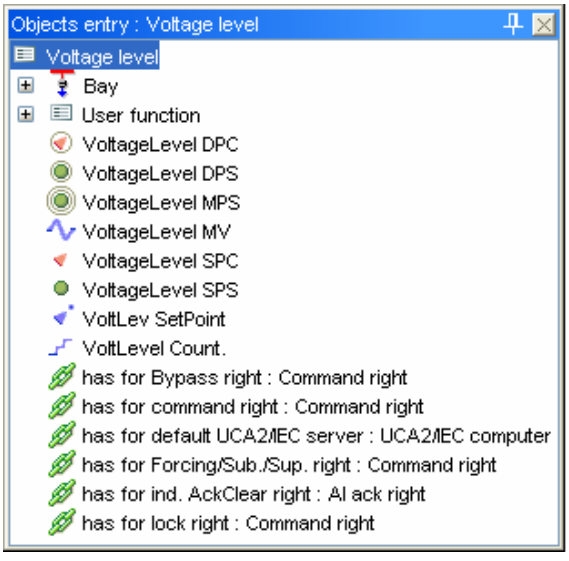



FIGURE 35: OBJECT ENTRY AREA

## 3.7 Graphic Area

This graphic area is represented by a moveable window.

It is the central area in docking window management (like also Navigator) when Graphic Perspective (Windows menu) has been chosen.

It can receive various editors in according to the selected object in the **Navigator** and the selected attribute in the attributes editor.

As all objects, the graphic objects can be manipulated from the Navigator. Nevertheless, the graphic editor is helpful to create graphic objects, by showing a graphical representation of the objects.

Currently, the available editors are:

- **OI Mimic Editor**: to build the OI Mimics used by the operator interface,
- **Computer Mimic Editor**: to build the Computer Mimics used by the MiCOM C264 front panel HMI.
- **Bitmap Editor**: to build the bitmaps also used by the MiCOM C264 front panel HMI..

**A complete description of these editor is done in section Graphic menu, see § 4.4.**

# 4. PACiS SCE MENU COMMAND

All PACiS SCE actions are available through the menu bar items and/or contextual menu items.

Availability of theses items is contextual. For example, Edit/Paste is enabled if an object has been cut/copy before and a potential parent object has been selected in navigator. Theses conditions are described for each action.

## 4.1 File Menu

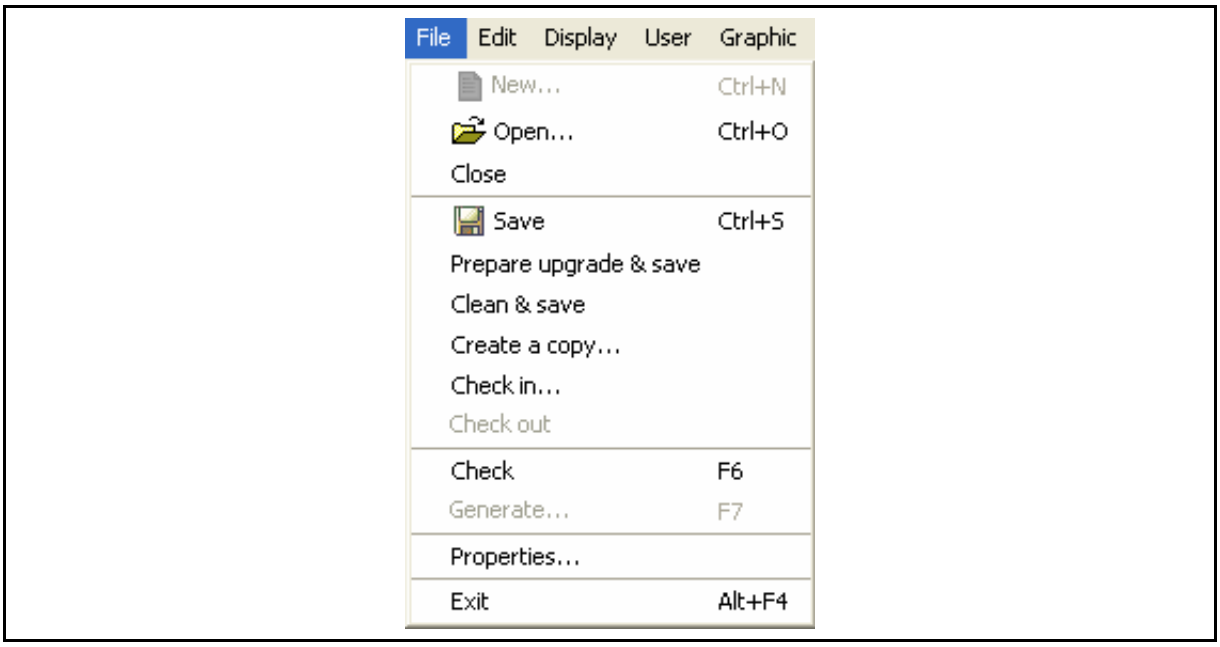



FIGURE 36: FILE MENU

A database is either a **configuration database** or a **library database**. A configuration database contains templates and a configuration which uses theses templates. A library contains only templates.

Database could have some different storing format:

- a compressed file: the database is a compressed file that contains all files of the database.
- a sub tree directory: the database is a directory and its files sub tree.

The storing format of a database is indicated by its file/directory extension. e.g.:

- .mpc: database configuration file
- .mpl: database library file
- .dpc: database configuration directory
- .dpl: database library directory

Each database is composed of several versions: a **working version** and some **referenced versions**. The working version can be updated (read and write), whereas referenced versions are frozen (read only).A Check In mechanism is used to reference the working version: it becomes a referenced version. A Check Out mechanism is used to transfer a referenced version to the working version.

No more than two databases can be opened simultaneously in the PACiS SCE:

- The first opened database is the **main database**. It can be the working version (opened in update mode) or a referenced version (opened in read-only mode).

- The second opened database is the **second database**. It can be opened only if the main database is the working version. It can be the working version or a referenced version (both opened in read-only mode). This second database is only used to transfer template from a database to the main database. This second database could be a configuration database or a library database. In both case, only the template part of this database is used to transfer some template from second database to the main database.

The item of menu file applies only to the main database, except the **Open** and **Close** actions that may also apply to the second database:

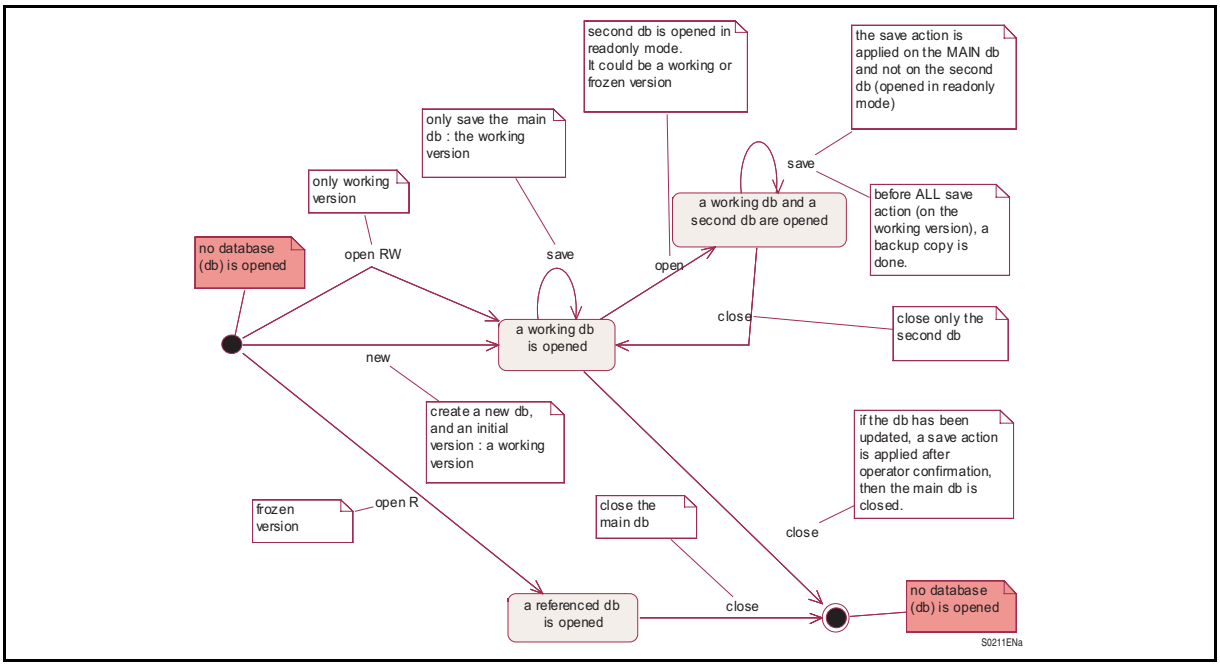

second db is opened in readonly mode.
It could be a working or frozen version
the save action is applied on the MAIN db and not on the second db (opened in readonly mode)
only save the main db : the working version
only working version
save
a working db and a second db are opened
before ALL save action (on the working version), a backup copy is done.
no database (db) is opened
open RW
save
open
close
close only the second db
a working db is opened
new
create a new db, and an initial version : a working version
if the db has been updated, a save action is applied after operator confirmation, then the main db is closed.
frozen version
open R
close the main db
close
a referenced db is opened
close
no database (db) is opened
S0211ENa

FIGURE 37 - MAIN / SECOND DATABASES

The **naming rule** of database is the following:

**Referenced version** is a file/directory with indices: v.r[.m]. e.g.:

```
databaseName.1.1.3.mpc
```

**indices** range is 0..99,

**third index (m)** is optional and is used for partial generation use case.

**database name** contains any alphabetic or numeric character or "_" or "-". Blank character is forbidden. This rule must be applied for database path also.

**Work version** of the configuration has no indices.

```
databaseName.mpc
```

4.1.1 File/New…

Purpose:

- Create a new working library(.mpl, .dpl) or configuration database (.mpc, .dpc)

Availability:

- No database loaded, or no working database.

Other call:

- Shortcut: Ctrl+N
- Toolbar

Operating:

- The action is available from start-up or if all loaded database have been closed. After this new action it is possible to open second database to pick-up data/templates.

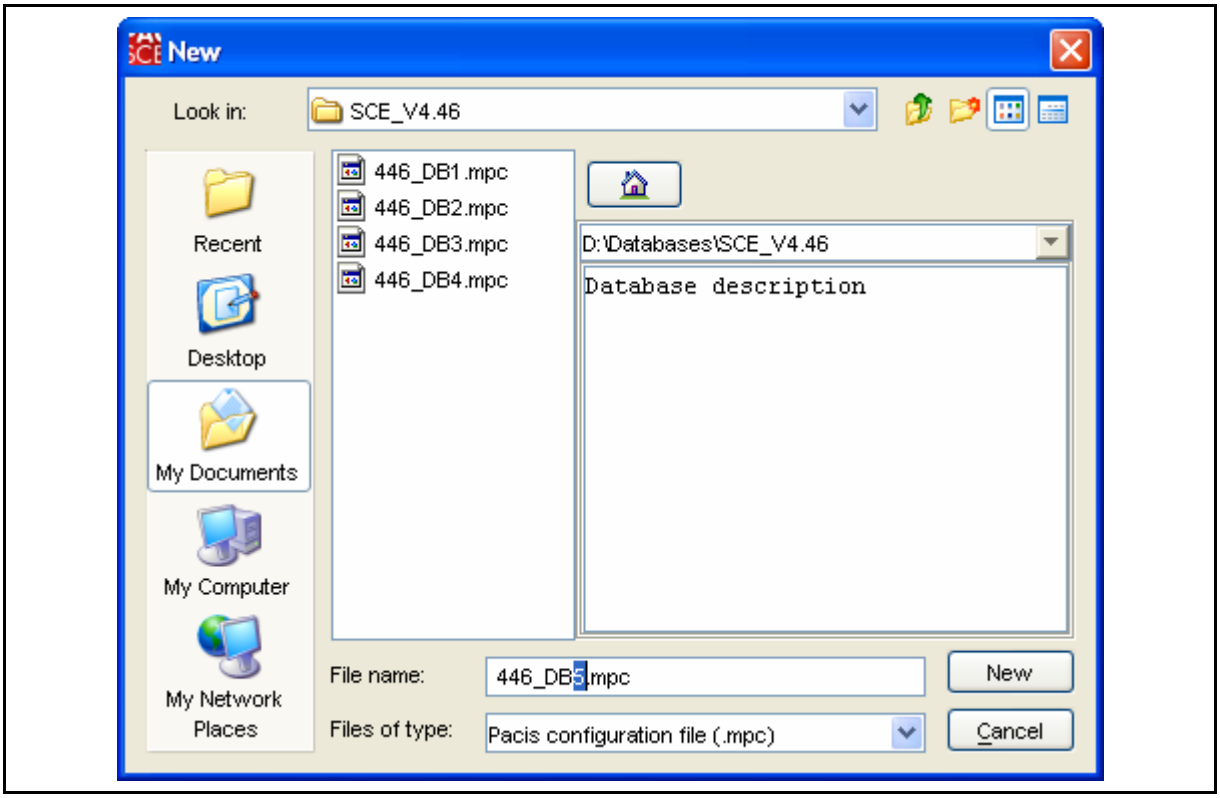



FIGURE 38: - FILE/NEW DATABASE

1. Browse the drive and directories selections to define where to store new file or directory
2. Enter a name for the New database in “File Name” area
3. Select the kind of database in “File Type” area with: mpc for configuration, or mpl for library
4. Validate by clicking the **New** button or enter in “file name” area

A first working file or directory is created. An empty working database is available under PACiS SCE interface.

With previous naming rules, the name is free, but **a good practice** is to **put PACiS SCE software version at its beginning**.

Example:

```
04_34_myDb.mpc
```

**Path of database** must contain only alphabetic or numeric character or "_" character or "-" character.

If the given name is wrong a warning message is displayed:

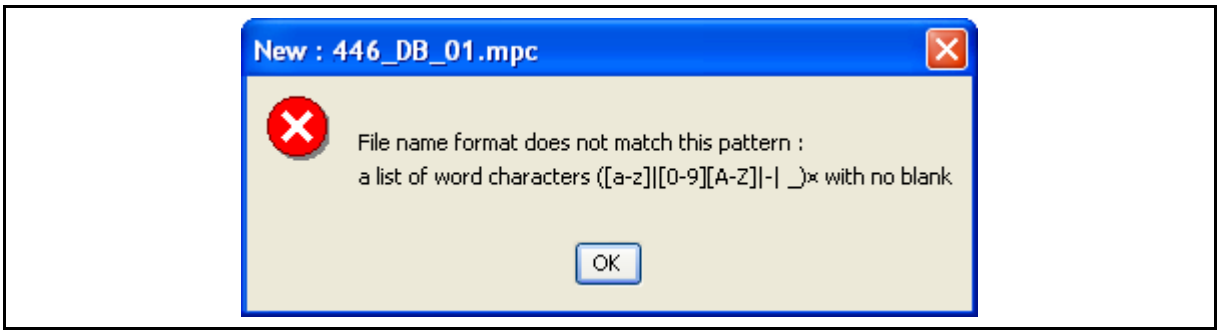



FIGURE 39: WRONG FILE NAME FORMAT

### 4.1.2 File/Open…

Purpose:

- Open an existing library/configuration database as main or second database. If no database already opens, it opens a main working database. If a work database is already opened, a second database is opened in read only, for copy of object to the working database.

Availability:

- Only two databases can be opened simultaneously

Other call:

- Shortcut: Ctrl+O
- Toolbar

Operating:

- The action is available from start-up, or when a main database is already defined. A pops up appears for selecting the database.

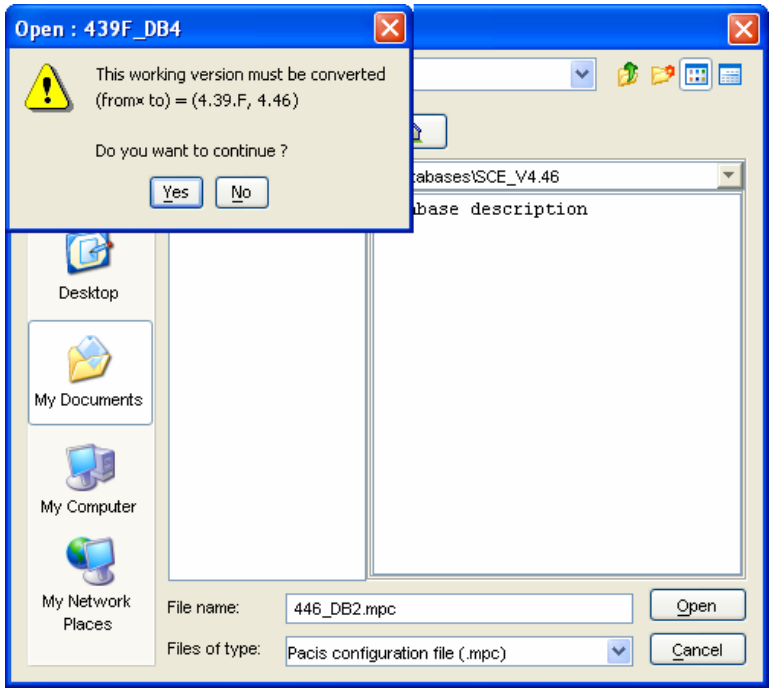



FIGURE 40: FILE/OPEN DATABASE

1. Browse directories to select the file to load with drive selection and directories
2. Select a filter with the kind of database in “File Type” area with: mpc for configuration, or mpl for library
3. Click on file name or enter the name of the database to load in “File Name” area
4. Check comments in write panel
5. Validate the selected file by clicking the **Open** button

The database is opened in a **temporary directory** (.mpx). By default, this temporary directory is an uncompressed copy of database that is created under the directory where the database is stored.

This directory where this temporary directory is created could be set explicitly via two PACiS SCE settings (tools/option).

The temporary directory could be directly the directory of database. This option is set by a PACiS SCE setting (tools/option) and is available for directory database format (.dpc, .dpl) only.

The **read/write mode** is displayed in title bar.

When PACiS SCE reads the open database, it checks with which PACiS SCE version it has been saved. If the PACiS SCE version was older, then some **upgrades can be necessary**: for example, adding a new attribute to an object, modifying the cardinality of an object, etc. In this case, the following dialog box is displayed:

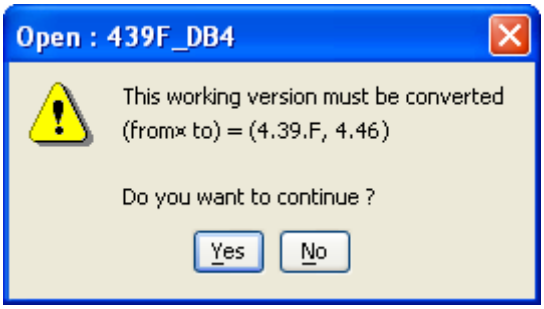



FIGURE 41: FILE/OPEN WITH DATABASE CONVERSION

If answer is “Yes”, then database is automatically upgraded to the new PACiS SCE data model. This upgrading is available only for a working version.

The upgrading process could be more complex, especially when new structure of databases is incompatible with the structure of database to open. In this case, the database must be saved with a special command: “prepare upgrade & save”. Then opening this kind of database is available.

### 4.1.3 File/Close

Purpose:

- Close opened library/configuration database as main or second database.

Availability:

- when a database has been opened.

Other call:

- Main window close button

Operating:

- The name of the database is already defined from Open/New. If main database is a working database and some modifications have been done, it asks to Save the database:

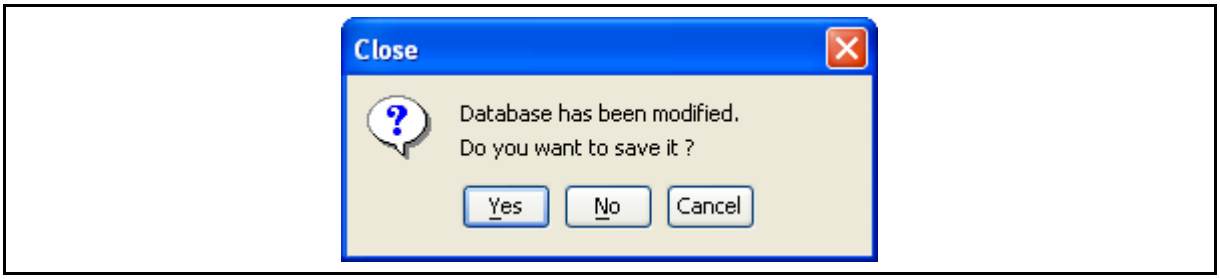



FIGURE 42: - FILE/CLOSE ASKING FOR SAVE WORK DATABASE

- If a second database is opened, it’s closed and the working database is still opened.

### 4.1.4 File/Save

Purpose:

- Save the working opened library/configuration database. Second database can not be modified and does not need a save action.

Availability:

- Only the working version of a database (read/write) can be saved

Other call:

- Shortcut: Ctrl+S
- Toolbar
- Main window close button if database has been modified

Operating:

- Only the working version of a database (read/write) can be saved

4.1.5 File/Prepare upgrade & Save

Purpose:

- Save the main opened library/configuration database and put into the database file an xml form of the database. This xml form could be used during opening operation if the structure of the data model has been changed (see File/ Open)

Availability:

- Only the working version of a database (read/write) can be saved with this option

Other call:

- None

Operating:

- An xml backup of the database is done. This xml backup is stored in .mpc file.

4.1.6 File/Clean & Save

Purpose:

- Compact the main opened library/configuration database and save it. The compaction consists to delete the space not used in database file: when an object is deleted, its space is not freed.

Availability:

- Only the working version of a database (read/write) can be cleaned and saved.

Other call:

- None

Operating:

- An xml backup of the database is done. This xml backup is stored in .mpc file.

### 4.1.7 File/Create a copy

Purpose:

- Copy the main library/configuration database into a new database.

Availability:

- Always

Other call:

- None

Operating:

- The action starts a pop-up to enter new file name where is stored the copy and eventually modify the store format of the database (.mpc <> .dpc or .mpl <> .dpl):

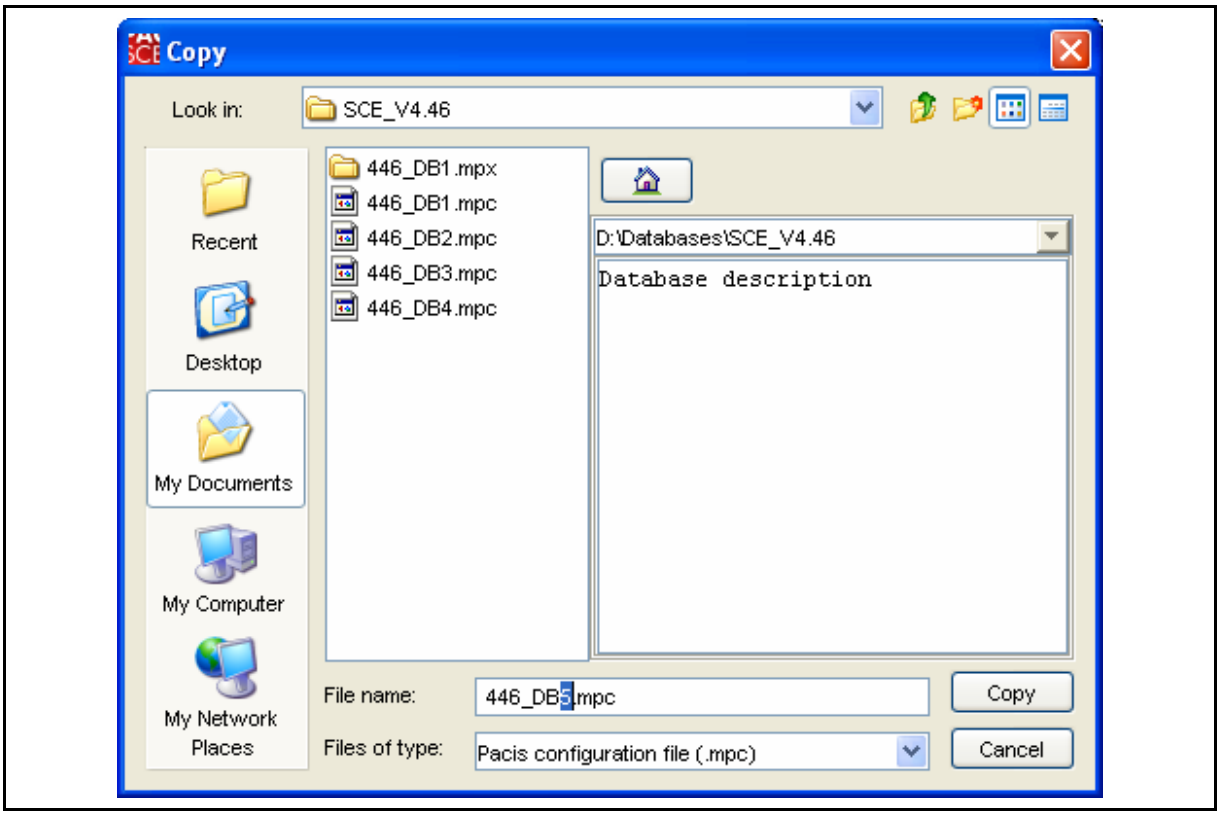



FIGURE 43: COPY FILE CHOOSER

The current database remains the same and needs to be saved later if modifications have been done. To switch to the database copy, it is needed to save and close the main database, then open the copied database.

4.1.8 File/Check in…

Purpose:

- Save the current working database (template or configuration) in a referenced file version. The working database is not saved but only copied. The “check in” file is named like work database with increment of database version. Check in file is then read only from PACiS SCE until a check out.

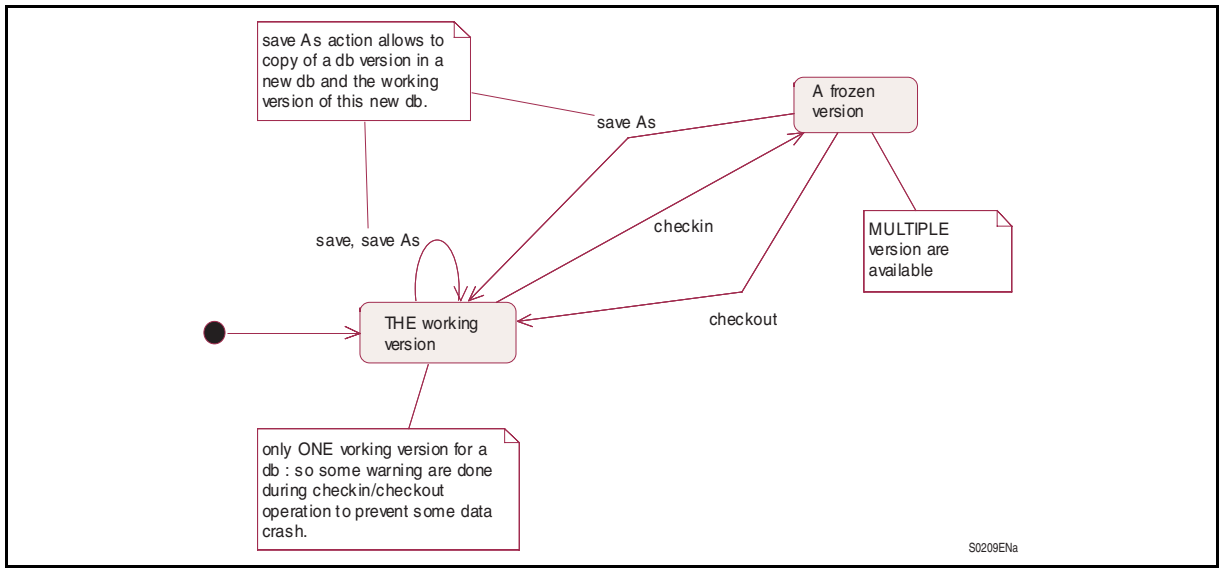

save As action allows to copy of a db version in a new db and the working version of this new db.
save As
A frozen version
save, save As
checkin
MULTIPLE version are available
THE working version
checkout
only ONE working version for a db : so some warning are done during checkin/checkout operation to prevent some data crash.
S0209ENa

FIGURE 44 - CHECK IN / CHECK OUT MECHANISM

Availability:

- Only with working version of a database

Other call:

- None

Operating:

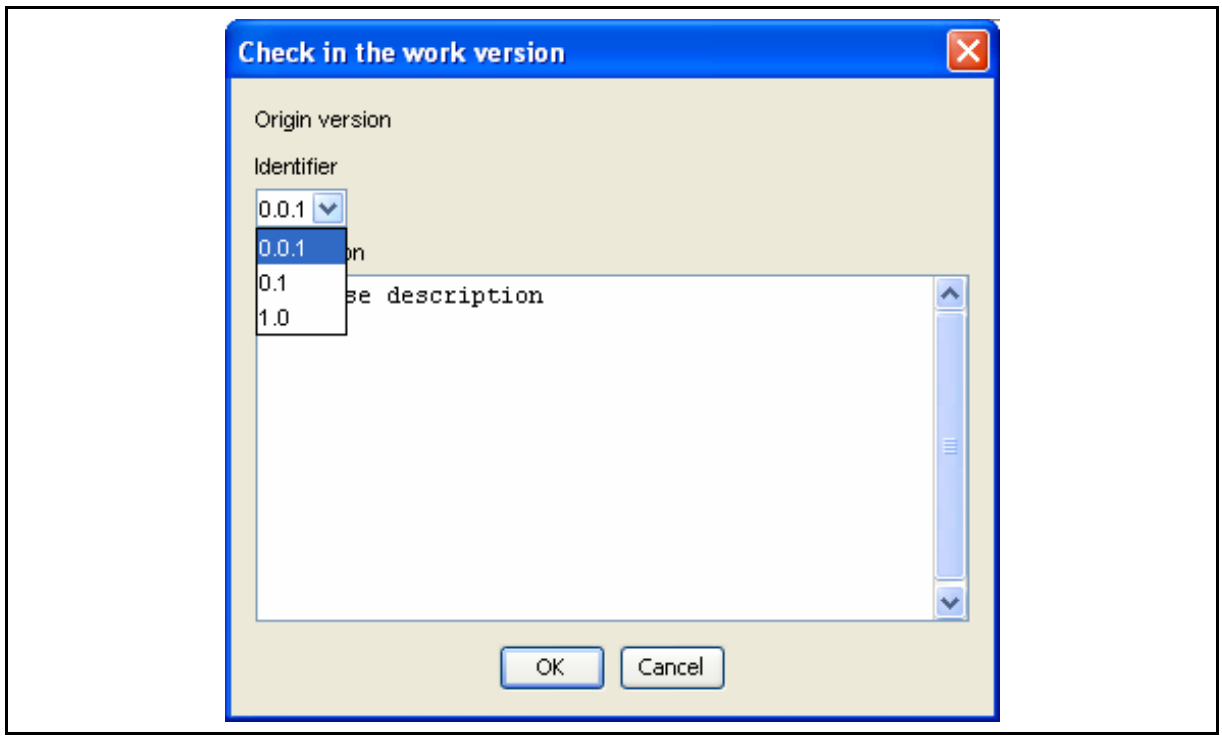



FIGURE 45: FILE/CHECK IN WORKING DATABASE

1. Select new reference identifier
2. Write comments
3. Confirm check-in by clicking the **OK** button

A pop-up window asks for **identifier increment** with major or minor evolution. PACiS SCE computes directly the proposed identifier from current one. In example it starts from 0.0. If current identifier is 3.5 it proposes 3.5.0, 3.6, and 4.0. This reference is added to the file name.

A field text area allows to precise the content or the modification of the version. This **comment** is stored in the database file. It is possible at any moment to read it with File/Properties.

A **good practice** is to keep reference 0.x for development, and 1.x, 2.x for major steps of project life: prototype, Factory version, site version… Major index modification can be also a consequence of PACiS SCE software evolution.

**Three indices versions** (for example 3.5.1) are used for partial generation of database: only a subset of devices are taken into account during device configuration files process (file/generate).

The loaded database is still the working database.

**'Check in' does not mean Check**: a referenced version (with a check in) is not mandatory a full consistent database (test done with Check operation). An inconsistent database can be referenced but a warning message is then displayed. During opening operation, if the working version does not come from the latest referenced version of database, the following warning dialog box is displayed:

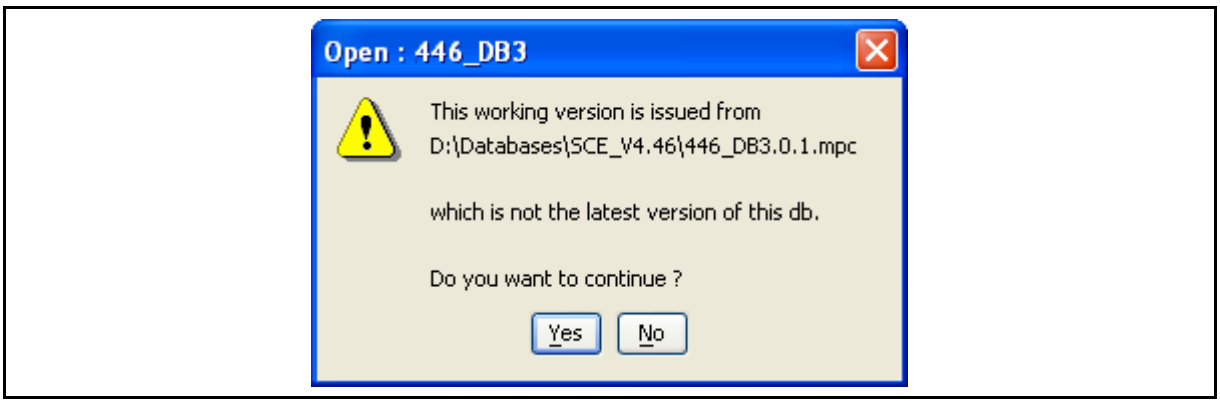



FIGURE 46: FILE/OPEN AND CHECK IN WORKING DATABASE

### 4.1.9 File/Check out

Purpose:

- A referenced database could not be modified (read only). The check out action allows to transform the referenced database into a working database.

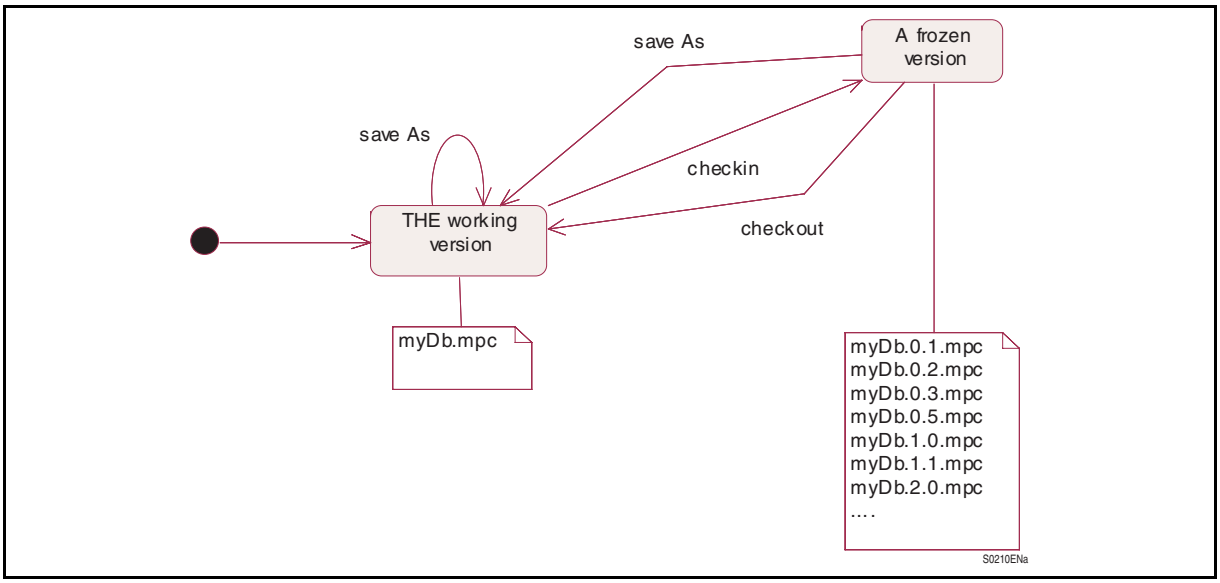



FIGURE 47 - FILE/CHECK OUT DATABASE, EXAMPLE

Availability:

- Only with loaded referenced version of a database

Other call:

- None

Operating:

- The referenced version is copied into the working version. The previous working version is overwritten. If the referenced version to check out is not the latest version, a warning dialog box is displayed:

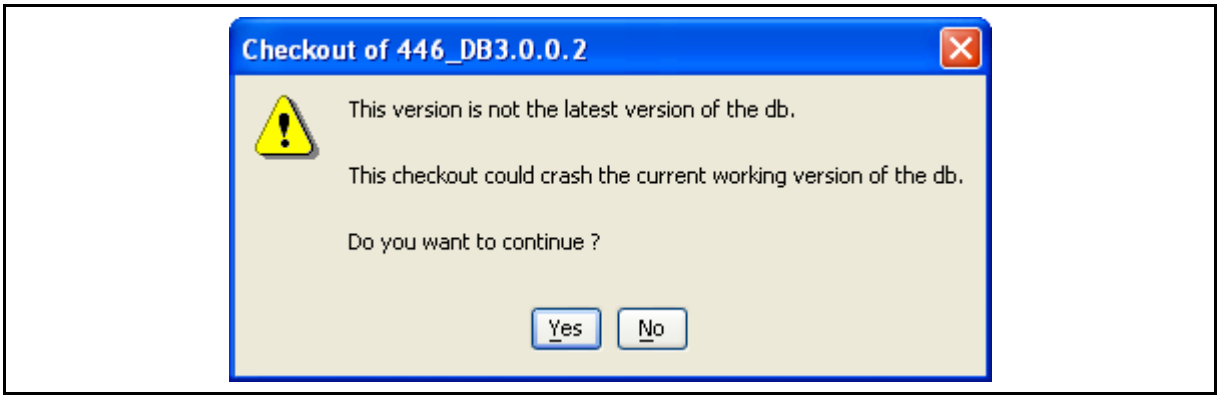

Checkout of 446_DB3.0.0.2
This version is not the latest version of the db.
This checkout could crash the current working version of the db.
Do you want to continue ?
Yes
No

FIGURE 48: FILE/CHECK OUT WARNING

### 4.1.10 File/Check

Purpose:

- **Check** the main library/configuration database **consistency**. The action starts testing on whole database. The templates and the spared objects are not taken into account by the check function. The **complete definition** of errors/warnings is available in **chapter PACiS SCE/EN MF**.
  All errors/warnings are displayed in the following table of the Trace panel ("Checks" tab):

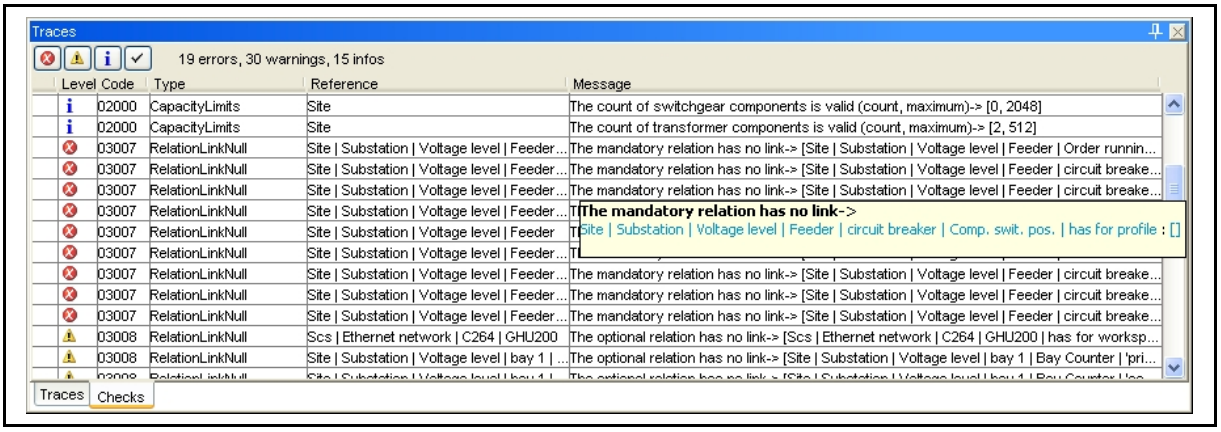

Traces
19 errors, 30 warnings, 15 infos
Level Code Type Reference Message
02000 CapacityLimits Site The count of switchgear components is valid (count, maximum)-> [0, 2048]
02000 CapacityLimits Site The count of transformer components is valid (count, maximum)-> [2, 512]
03007 RelationLinkNull Site | Substation | Voltage level | Feeder... The mandatory relation has no link-> [Site | Substation | Voltage level | Feeder | Order runnin...
03007 RelationLinkNull Site | Substation | Voltage level | Feeder... The mandatory relation has no link-> [Site | Substation | Voltage level | Feeder | circuit breake...
03007 RelationLinkNull Site | Substation | Voltage level | Feeder... The mandatory relation has no link-> [Site | Substation | Voltage level | Feeder | circuit breake...
03007 RelationLinkNull Site | Substation | Voltage level | Feeder... The mandatory relation has no link->
Site | Substation | Voltage level | Feeder | circuit breaker | Comp. swit. pos. | has for profile : []
03007 RelationLinkNull Site | Substation | Voltage level | Feeder
03007 RelationLinkNull Site | Substation | Voltage level | Feeder...
03007 RelationLinkNull Site | Substation | Voltage level | Feeder... The mandatory relation has no link-> [Site | Substation | Voltage level | Feeder | circuit breake...
03007 RelationLinkNull Site | Substation | Voltage level | Feeder... The mandatory relation has no link-> [Site | Substation | Voltage level | Feeder | circuit breake...
03007 RelationLinkNull Site | Substation | Voltage level | Feeder... The mandatory relation has no link-> [Site | Substation | Voltage level | Feeder | circuit breake...
03008 RelationLinkNull Scs | Ethernet network | C264 | GHU200 The optional relation has no link-> [Scs | Ethernet network | C264 | GHU200 | has for worksp...
03008 RelationLinkNull Site | Substation | Voltage level | bay 1 | ... The optional relation has no link-> [Site | Substation | Voltage level | bay 1 | Bay Counter | 'pri...
Traces
Checks

FIGURE 49 - ERROR / WARNING CHECK TABLE

Table rows: each row corresponds to one check operation whose result is an error or a warning.

Table columns:

- **Level**: it displays an icon for error or warning.
- **Type:** it contains the identifier of the check operation displayed in the row.

  Example: "DataObjectPhases" is a check consisting in verifying that all the phases under a GenWYE or GenDELTA DataObject, is linked, through the "has for IEC61850 address" relation, to distinct Datapoints.
- **Reference**: for each check operation, an object implicated in the check operation, is considered as the main object. The column displays the path of this object. If the user activates the "**Reach**" action on the row, this object is retrieved in the PACiS SCE navigator and selected. This action is also available with double-click.
- **Message:** it displays a message explaining the error/warning for the check operation.
- **First column:** the user can check On/Off this column to remember which error/warning he tried to correct.

The panel of the Table contains also the following buttons:

- **Errors filter toggle** button: if this button is selected, the Error traces are not displayed (they are filtered). Else they are.
- **Warnings filter toggle** button: if this button is selected, the Warning traces are not displayed (they are filtered). Else they are.
- **Info filter toggle** button: if this button is selected, the Info traces are not displayed (they are filtered). Else they are.
- **Checked traces filter toggle** button: if this button is selected, the Checked traces are not displayed (they are filtered). Else they are.

Availability:

- For referenced or working version of a database

Other call:

- Shortcut: F6

Operating:

1. Before the beginning of the check, PACiS SCE clears the **Check Traces tab,** displays it and displays a waiting popup
2. During the check computing, PACiS SCE displays the found errors or warnings in the Check Traces tab. The number of **errors and warning are updated** at the top of Check Traces tab
3. After the check, the content of the Check Traces tab is **saved** in the **check.txt** file in the folder of the configuration. This file is a text file. It can be displayed in Microsoft Excel with the file type: Text (separator: tabulation), or in any text editor.
4. PACiS SCE notifies that the Configuration Database is modified and has to be saved (check.txt file and Configuration settings are to be saved).

### 4.1.11 File/Generate…

Purpose:

Generate from PACiS SCE current database the equipment database to load into system devices. This equipment database is a Zip file which is used by the SMT (System Management Tool). It's called **System Data Bag** (*.sdb). There **is no software interface** between SMT and PACiS SCE. The exchanges are done manually with files.

This System Data Bag contains all device configuration files which are named **Application Data Bags** (*.adb). There's an Application Data Bag for each equipment configuration to be generated. For each equipment, there's also a Maintenance Data Model (*.dm) for SMT to access the equipment through the Station Bus.

For the simulation application (equipment simulator and process simulator), the application databags are directly the configuration files of the simulators: .xml for the equipment simulator, .zip for the process simulator.

Availability:

- Only for **referenced configuration** database version. The library database and the working database version are not available.
- If the referenced configuration has not been consistent (file/check has been done with no error), File/generate action is not available.

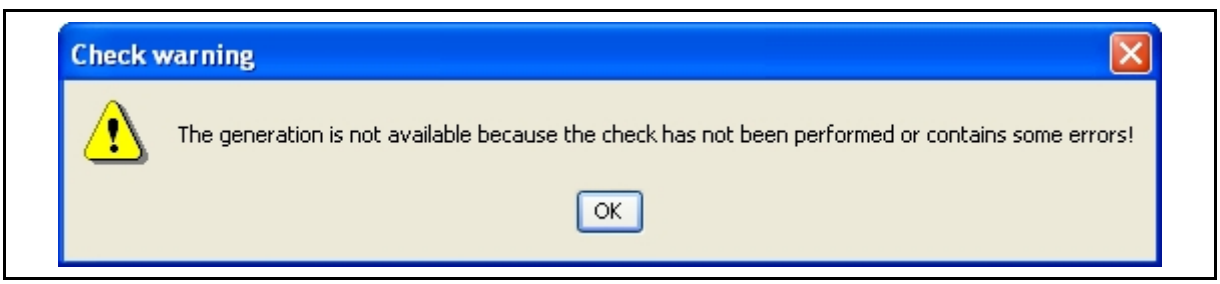



FIGURE 50 - CHECK WARNING FOR NO-CONSISTENT
OR OBSOLETE CONSISTENT CHECK

Other call:

- Shortcut: F7

Operating:

1. File/Open a referenced (and check in) version. This means that in common cases, the user may have to:
   - check in its working database,
   - notice the check in the new version reference,
   - save the working database for future modification,
   - close the working database,
   - open the database with new referenced version.
2. Select **File/Generate…**
3. A **Generation** dialog box lists all SBus devices available on database and allows to select a part or all of them. The spare devices are not displayed.
4. Only if referenced version has a third index, select the devices. Otherwise all devices are pre-selected.
5. Select the output directory, where the System Data Bag will be generated, with the **…** button.
6. Click the **Run** button.

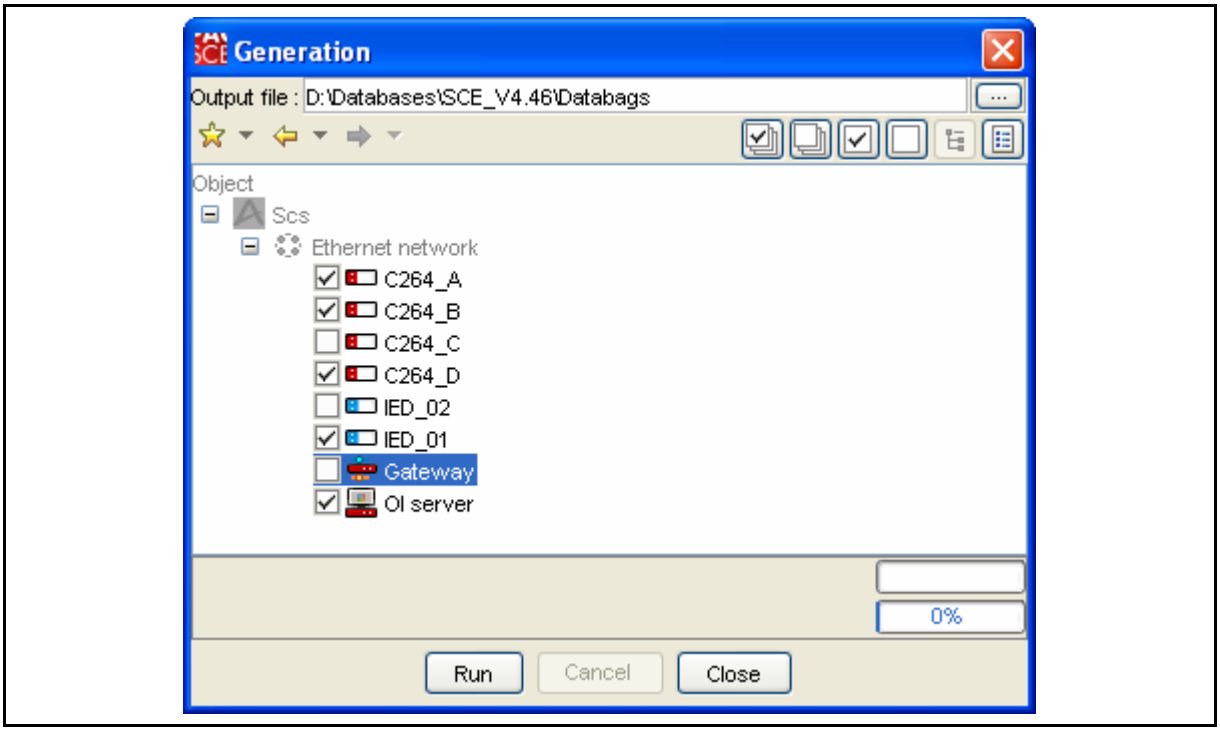



FIGURE 51: FILE/GENERATE DIALOG BOX

7. The action progression is displayed graphically. This progression can be followed in three ways:

   - the progress bar is animated to display the percentage of achievement of the process (the value is a ratio of number of treated items),
   - the messages displayed on status bar which are specific of each using,
   - the nodes of the browser change in function of their processing state to follow processing.

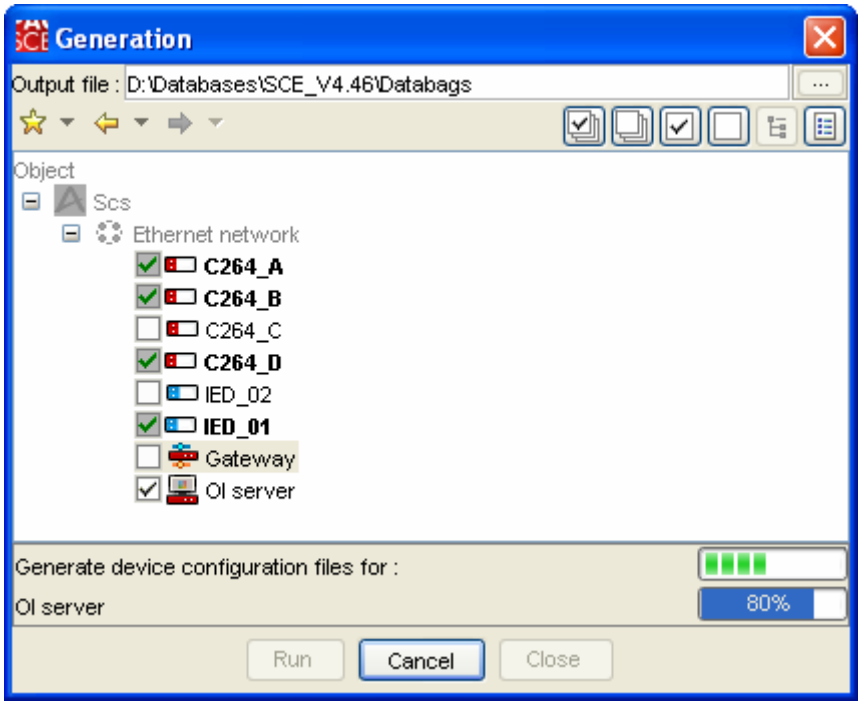



FIGURE 52: FILE/GENERATE PROGRESSION

At the end of generation the final result of generation is presented.

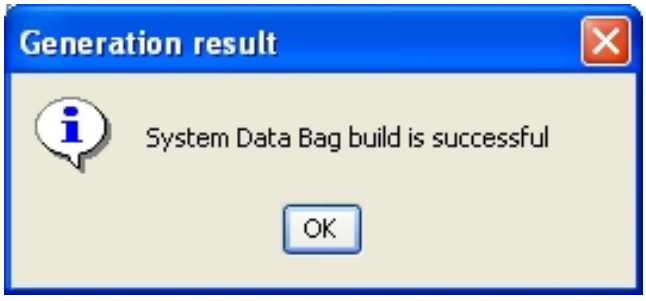



FIGURE 53 - FILE/GENERATE ... SUCCESSFUL

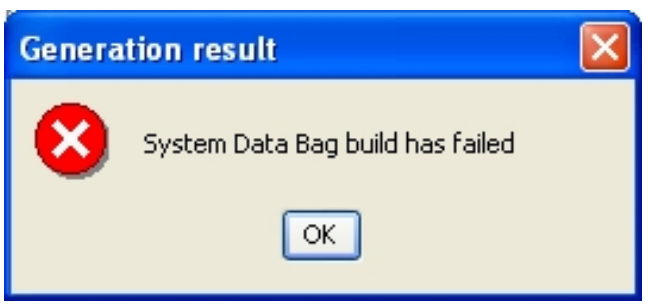



FIGURE 54 - FILE/GENERATE ... ERROR

A third result is a **warning** that indicates that some C264 configuration files could be too big for C264 downloading by SMT. It's only a warning and the System Data Bag is created.

So, If generation succeeds, the *.zip generated file is to be provided to SMT equipment that download equipment databases from the .zip

A **good practise** is to launch a **generation** only for a checked referenced **version** which has **no consistency error**.

### 4.1.12 File/Properties

Purpose:

- Display all properties of the database:

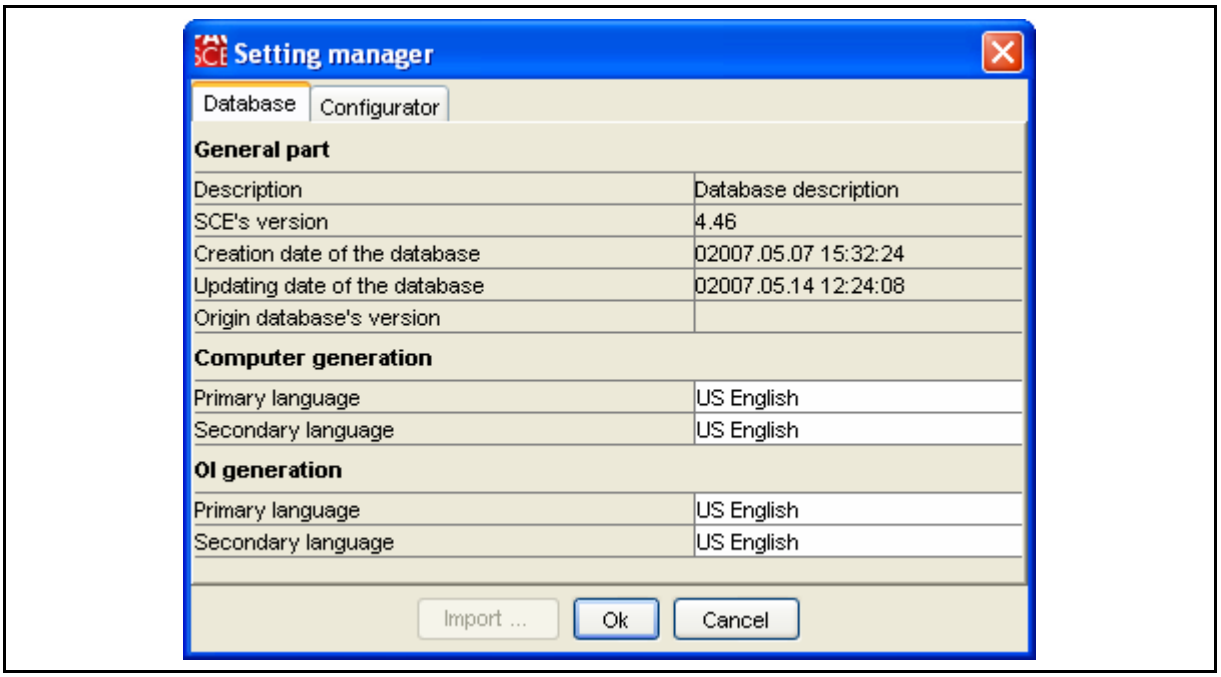



FIGURE 55: - FILE/PROPERTIES SETTING MANAGER ON WORK DATABASE

Only Languages used during File/Generate for OI and C264 localization could be updated. Theses fields could be also updated through Tools/Languages.

Availability:

- When database has been opened

Other call:

- None

Operating:

- Leave this display by Ok or Cancel. Cancel button restore the previous value of editable field, i.e. Description.

### 4.1.13 File/Exit

Purpose:

- Leave PACiS SCE application

Availability:

- Always

Other call:

- Shortcut: Alt+F4
- Window quit button or double click on title left icon

Operating:

- If main database is a working database and some modifications have been done, it asks to Save the database:

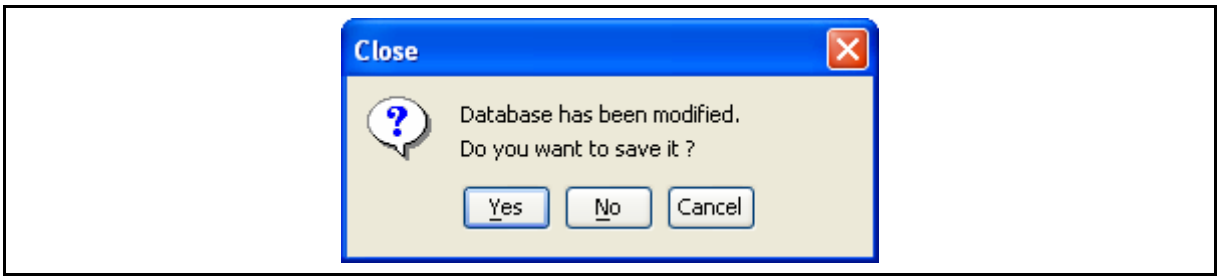



FIGURE 56: - FILE/EXIT AND PENDING MODIFIED DATABASE

- If answer is **Yes**, current working database is saved before exit,
- if answer is **No**, exit PACiS SCE application with no save,
- if answer is **Cancel**, cancel exit operation, come back to edition mode.

## 4.2 Edit Menu

This menu defines all available items while data edition: a data can be an object, an attribute, a graphic representation of an object, etc. The edition can occur in the different areas of PACiS SCE: navigator, components list, attribute editor, graphical editors, etc.

**Most of these items** are contextual and **don't appear directly in menu Edit**: they are defined by a contextual menu which depends on the type of selected object. This contextual menu is available with a right click on the focus element (node of navigator, item of list entry, graphical representation in mimic editor …).

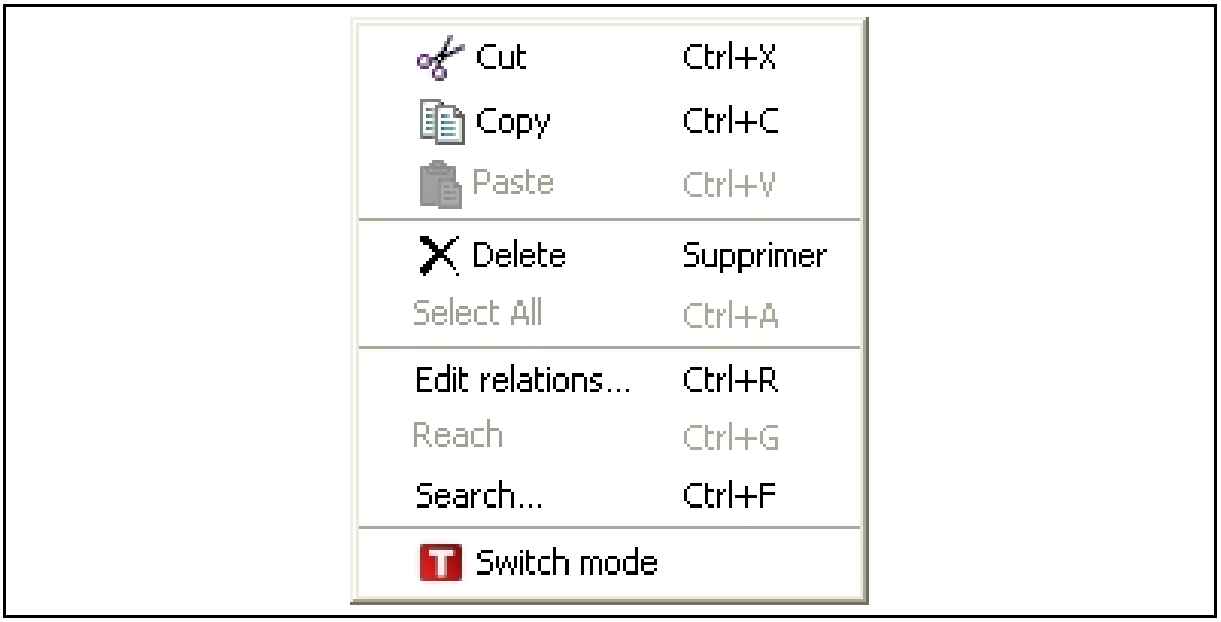



FIGURE 57 - EDIT MENU

### 4.2.1 Edit/Cut

Purpose:

- Cut the selected object/attribute to clipboard. The cut selection is moved to a new parent object.

Availability:

- Context dependent

Other call:

- Shortcut: Ctrl+X
- Toolbar
- Contextual menu (Mouse right click)

Operating:

1. Select the object/attribute to cut and choose cut item. In **Navigator**, **only one** object can be selected; in **Components list**, **multi-selection** is available (left click and shift, left click and ctrl).

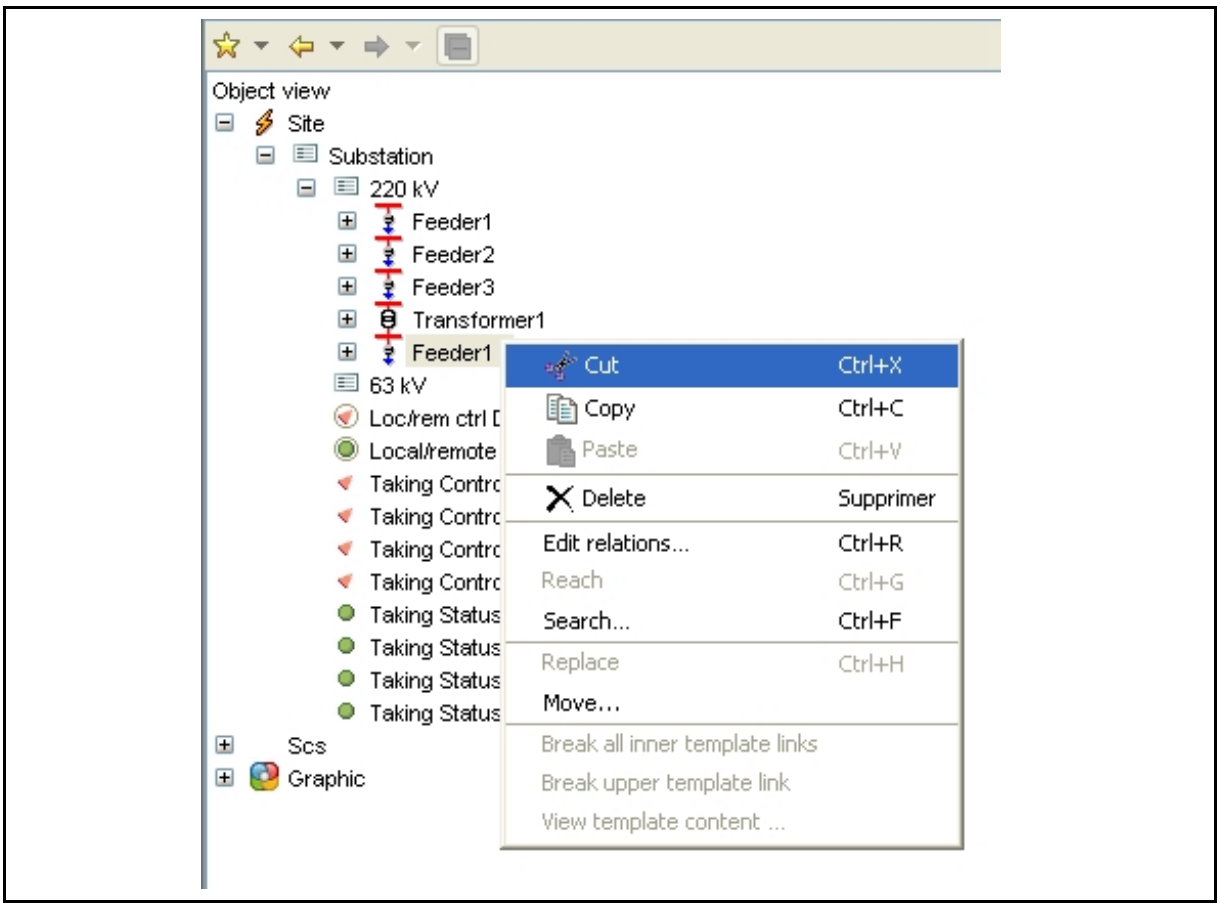



FIGURE 58 - EDIT/CUT

2. The object icon is **greyed** to indicate that a **cut/paste operation is in progress**. Any copy or another cut operation cancels the current cut/paste operation and the object icon is normal again.

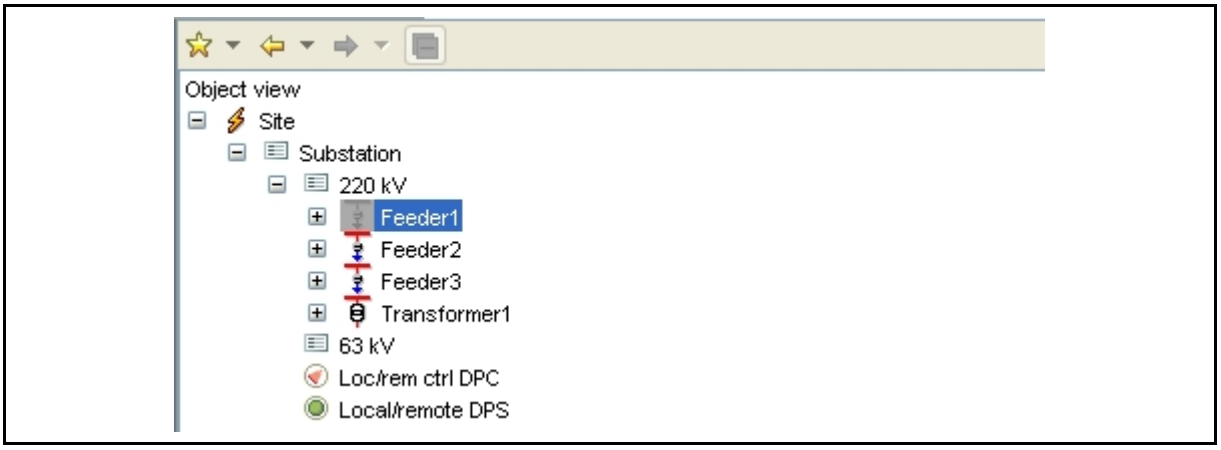



FIGURE 59 - EDIT/CUT RESULT

3. Select the **new parent** object/attribute where the cut object will be moved and choose paste item. The cut object is then moved to its new parent. If an object already exists with the same name under the same parent, the pasted object is renamed with an increment.

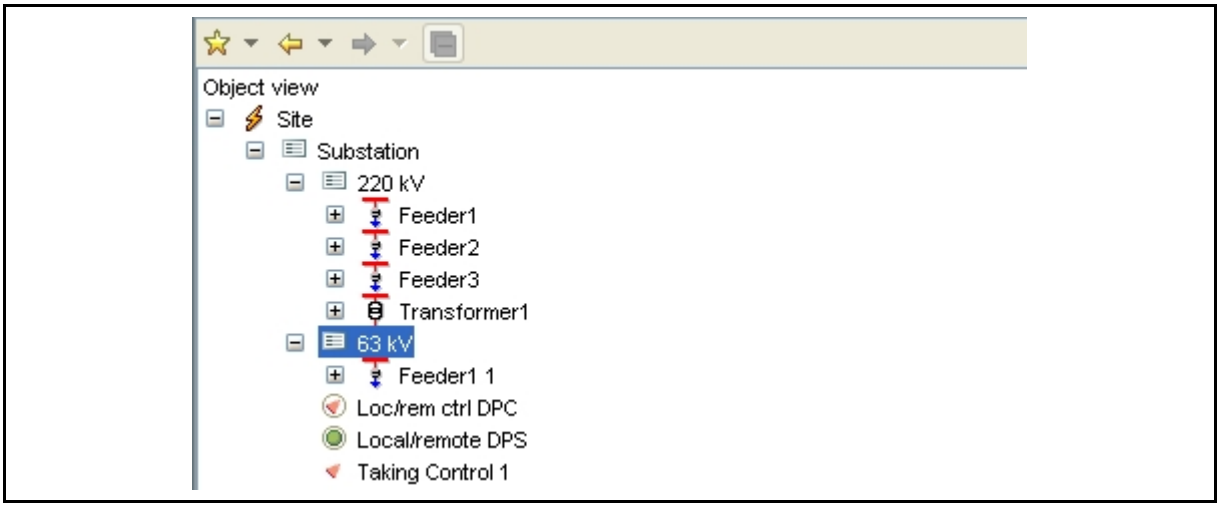



FIGURE 60 - EDIT/CUT-PASTE RESULT

### 4.2.2 Edit/Copy

Purpose:

- Copy the selected element to clipboard for further Paste action

Availability:

- Context dependent

Other call:

- Shortcut: Ctrl+C
- toolbar
- Contextual menu (Mouse right click)

Operating:

1. Select in any area the object (1 left click) or attribute (2 left click) to copy/Paste

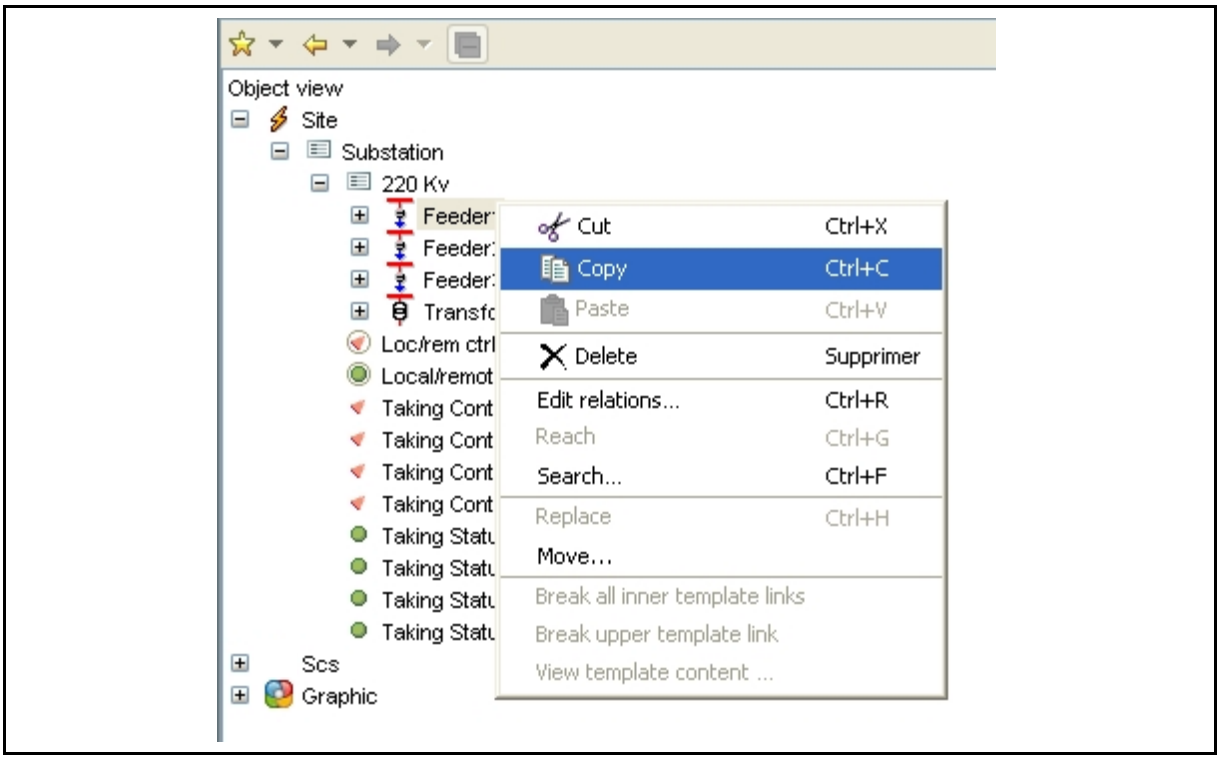



FIGURE 61 - EDIT/COPY

2. Copy the object/attribute
3. Select the object under which, or the attribute to paste
4. Edit/Paste (may be used several times) to paste copied object.

Copy action stores all objects and all hierarchy below it. Copy action tries to keep referenced relations.

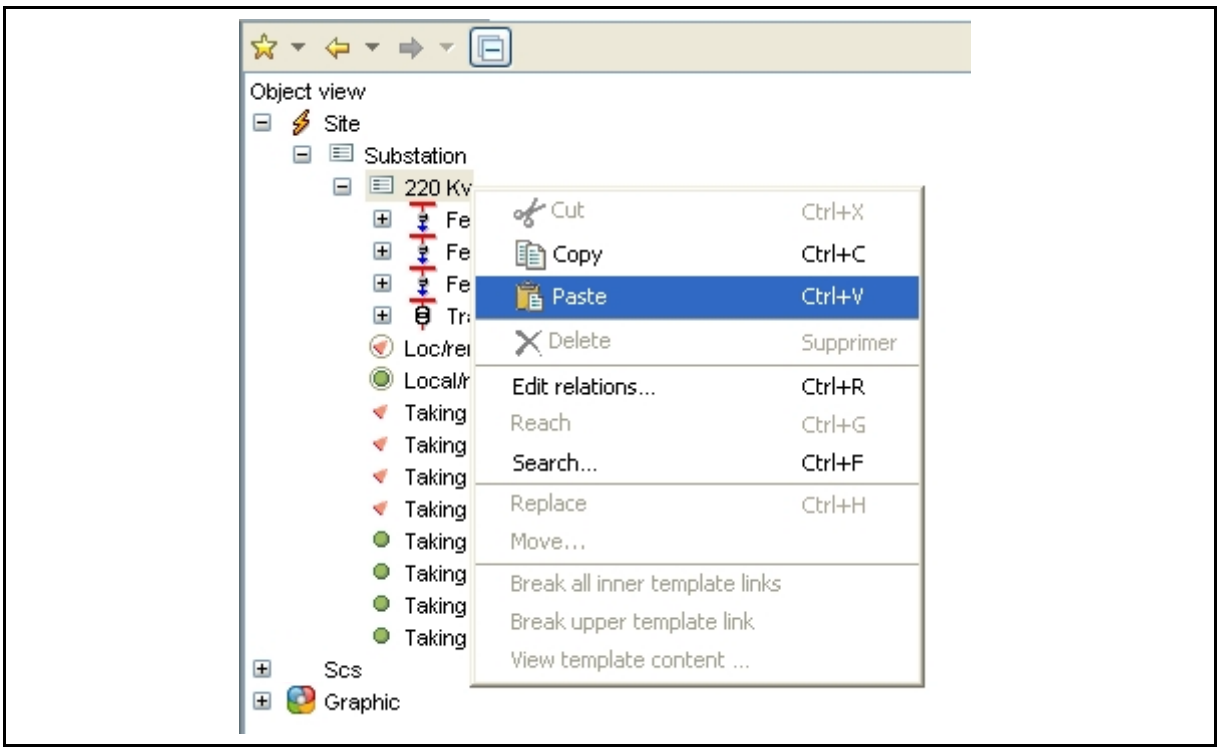



FIGURE 62 - EDIT/PASTE

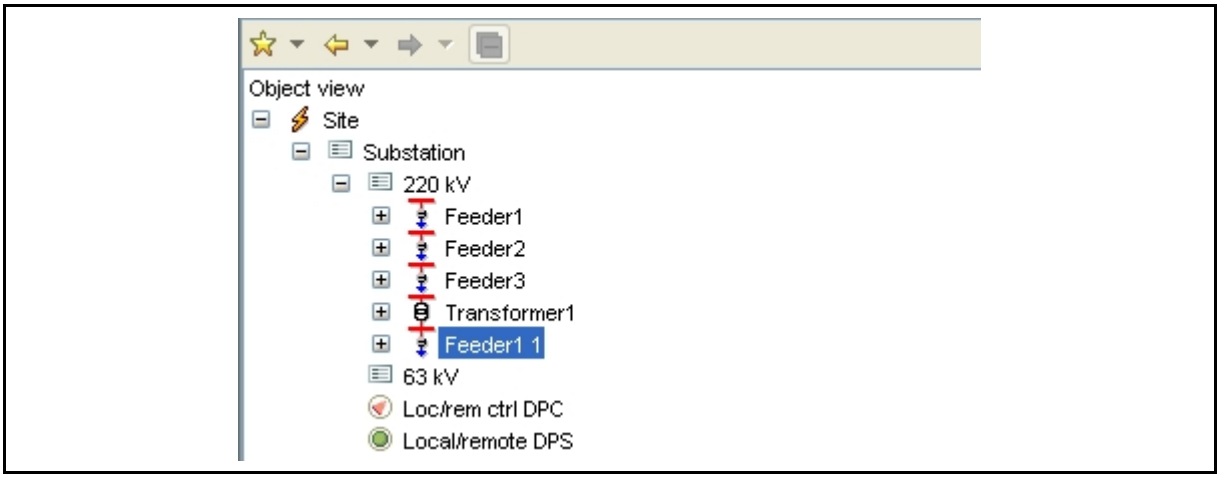



FIGURE 63 - EDIT/COPY-PASTE RESULT

### 4.2.3 Edit/Paste

Purpose:

- Paste the selected element from clipboard. This clipboard content comes from a cut action or a copy action. See Edit/Copy and Edit/Cut.

Availability:

- Context dependent

Other call:

- Shortcut: Ctrl+V
- Toolbar
- Contextual menu (Mouse right click)

Operating:

- Select object under which the paste operation should be done, then paste. Paste can be used several times after a copy action. It inserts all hierarchy below copied object, all attributes and all relations.

### 4.2.4 Edit/Delete

Purpose:

- Delete the selected element: object, template, Unified Template, Parameter…
- A general setting allows to confirm or not any delete operation.

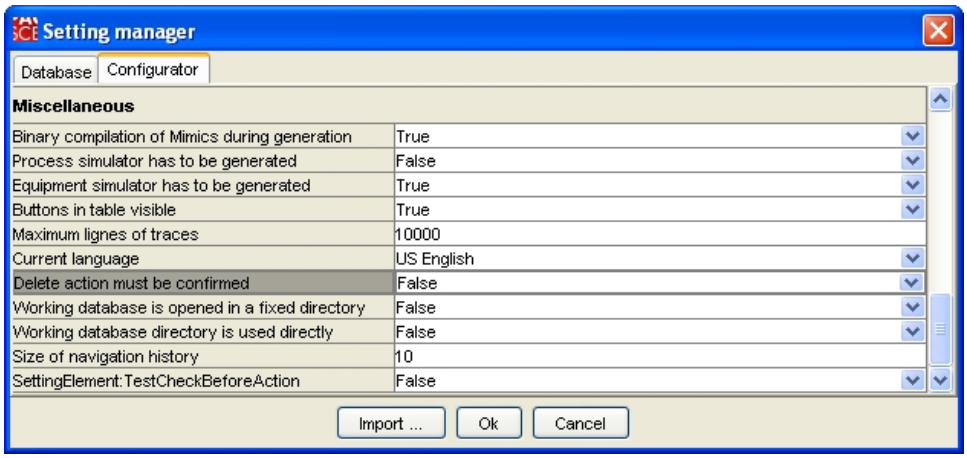



FIGURE 64 - EDIT/DELETE CONFIRMATION SETTING

If this option is set to True, before each delete operation, the following dialog box is displayed:

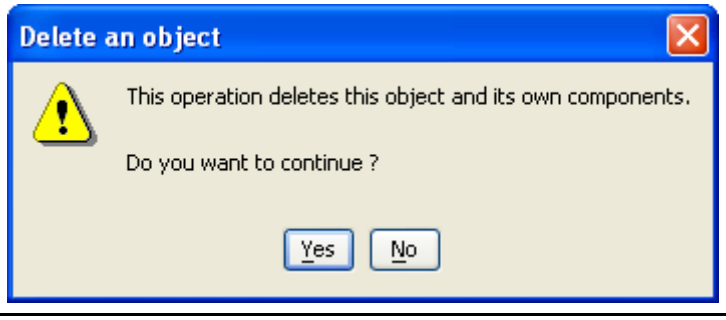



FIGURE 65: - EDIT/DELETE CONFIRMATION DIALOG BOX

Availability:

- Depending on the selected element and associated conditions

Other call:

- Shortcut: Del
- Toolbar

Contextual menu (Mouse right click) in Navigator, Components list, Templates list

### 4.2.5 Edit/Select all

Purpose:

- Select all graphic objects in graphic viewers (OI Mimic viewer or Computer Mimic viewer).

Availability:

- The graphic viewer must have the focus.

Other call:

- Contextual menu of graphic viewer (Mouse right click)
- Shortcut: Ctrl+A.
- Be care: when Navigator has the focus, Ctrl+A moves the current selection to the root.

Operations:

1. Click to the graphic viewer or select a graphic object in the viewer.
2. Choose Select All item: all graphic objects of mimic are selected.

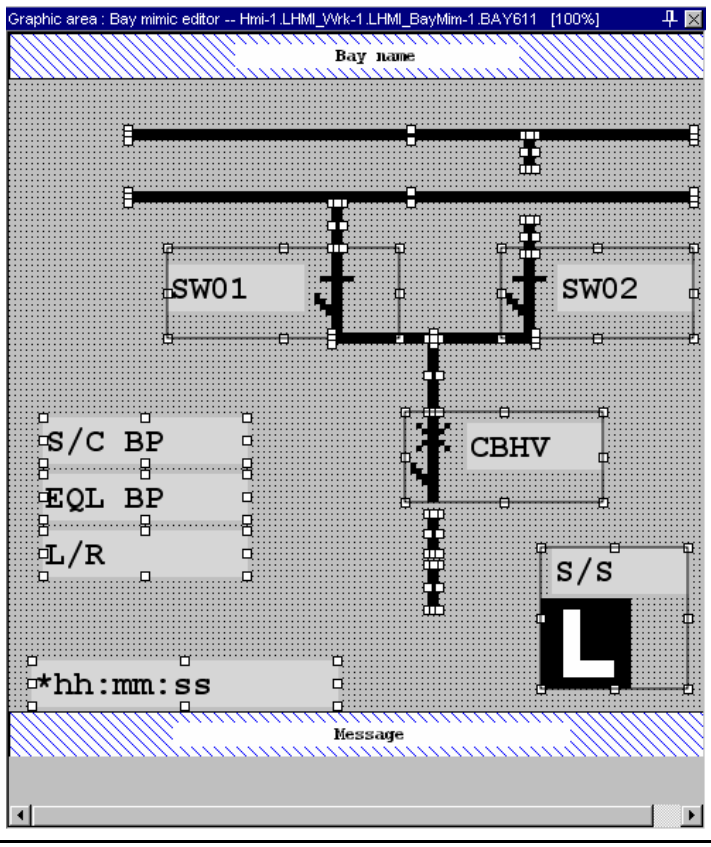



FIGURE 66 - EDIT/SELECT ALL

### 4.2.6 Edit/Edit relations

Purpose:

- The relation editor is a dialog providing **multiple relations creating** with automatic linking with objects.

Availability:

- Depending on the selected element

Call:

- Contextual menu (Mouse right click) in Navigator, Components List

Operations:

1. Select an object from Navigator or Components list. Choose Edit relations item.
2. This **modal** dialog box appears:

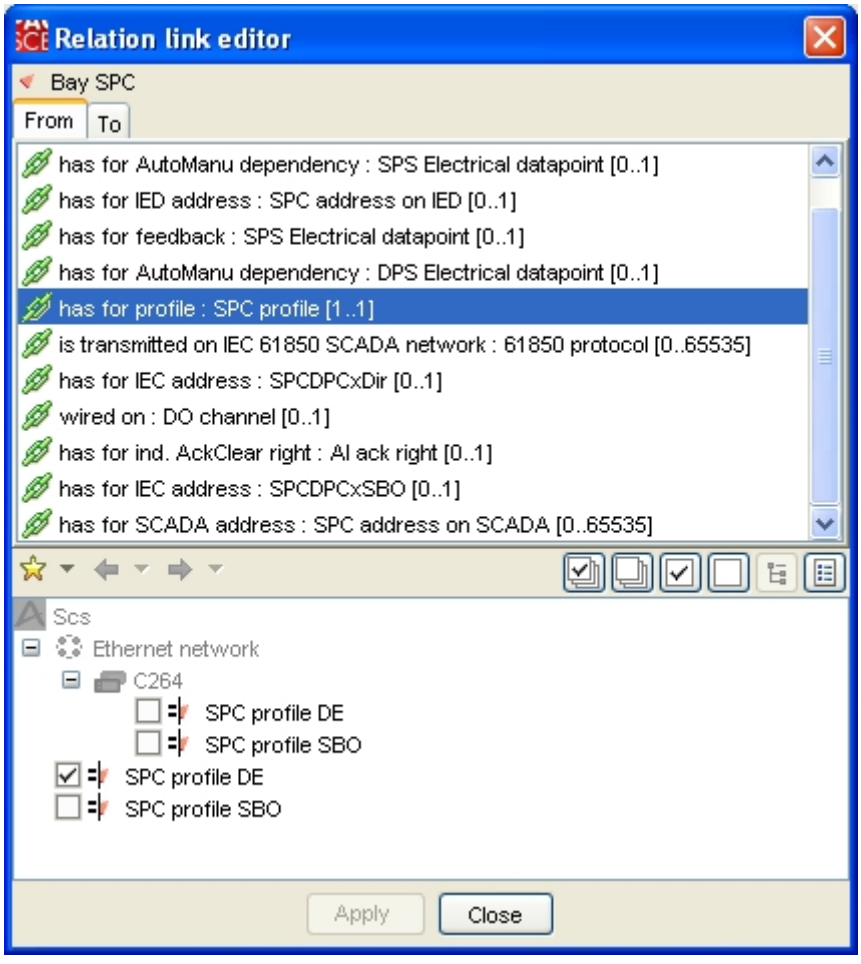

Relation link editor
Bay SPC
From
To
has for AutoManu dependency : SPS Electrical datapoint [0..1]
has for IED address : SPC address on IED [0..1]
has for feedback : SPS Electrical datapoint [0..1]
has for AutoManu dependency : DPS Electrical datapoint [0..1]
has for profile : SPC profile [1..1]
is transmitted on IEC 61850 SCADA network : 61850 protocol [0..65535]
has for IEC address : SPCDPCxDir [0..1]
wired on : DO channel [0..1]
has for ind. AckClear right : AI ack right [0..1]
has for IEC address : SPCDPCxSBO [0..1]
has for SCADA address : SPC address on SCADA [0..65535]
Scs
Ethernet network
C264
SPC profile DE
SPC profile SBO
SPC profile DE
SPC profile SBO
Apply
Close

FIGURE 67 - RELATION LINK EDITOR

On top, the working object is remembered to know where user is working.

On bottom, two buttons: the first allows to apply modification and the other closes dialog box.

Two main parts:

- the **relation list** which displays all relations available for the selected object,
- the **object tree** which displays all objects available for the current selected relation.

A relation between two objects has a **direction**. So, the relation list is composed of two tabbed pane:

- "**From**" which gives relations for which the working object is the main object,
- "**To**" which gives relations for which the working object is the second object.

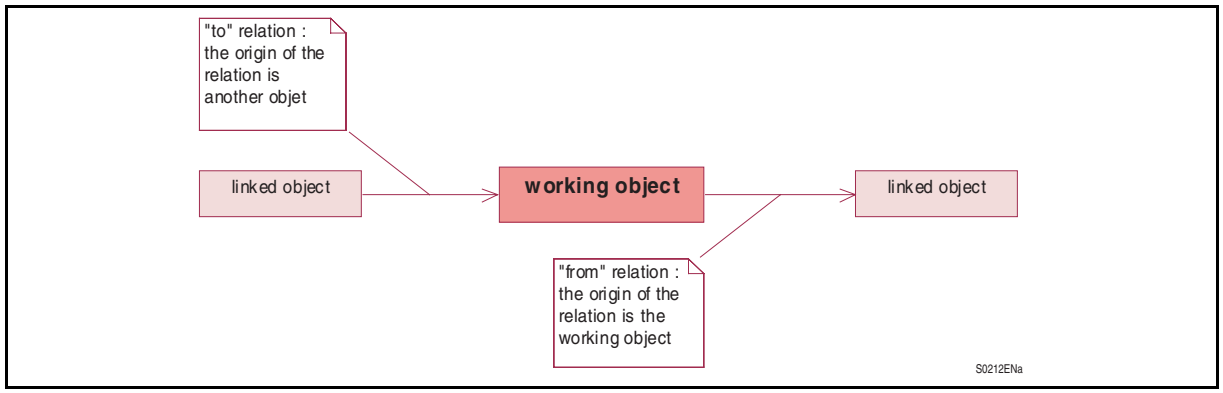

"to" relation : the origin of the relation is another objet
linked object
working object
linked object
"from" relation : the origin of the relation is the working object
S0212ENa

FIGURE 68 - RELATION DIRECTION

The relation label is the name of the relation, followed by the type of object which could be linked and then, the **cardinality** of the relation ([min .. max]).

User can select more than one object by checking check boxes, and when apply modification, it creates one relation for each new selected object and removes relation with new unselected objects, after controlling the cardinality.

So, if cardinality is respected by selection, after apply, there's one relation for each selected object, and no relation with others.

The object tree could be view as an **object list**:

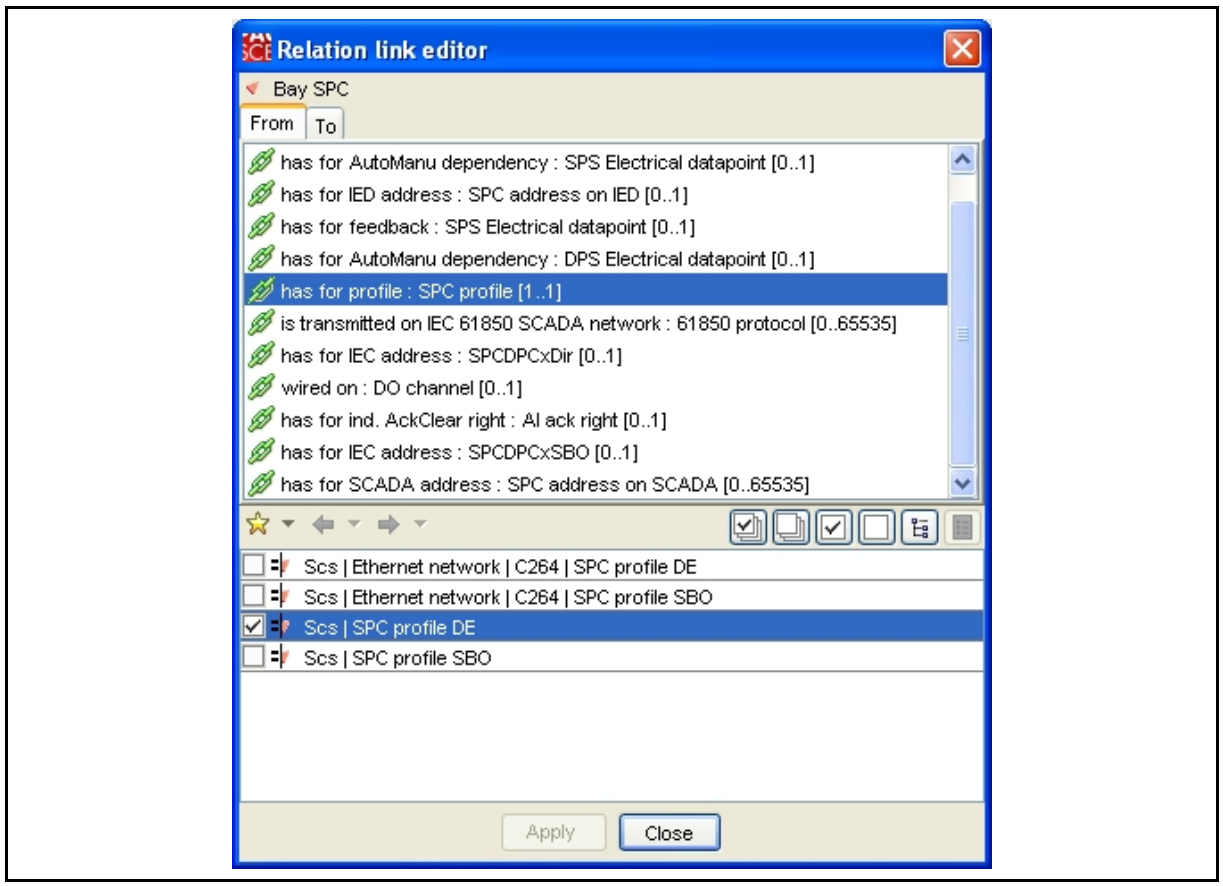

Relation link editor
Bay SPC
From
To
has for AutoManu dependency : SPS Electrical datapoint [0..1]
has for IED address : SPC address on IED [0..1]
has for feedback : SPS Electrical datapoint [0..1]
has for AutoManu dependency : DPS Electrical datapoint [0..1]
has for profile : SPC profile [1..1]
is transmitted on IEC 61850 SCADA network : 61850 protocol [0..65535]
has for IEC address : SPCDPCxDir [0..1]
wired on : DO channel [0..1]
has for ind. AckClear right : AI ack right [0..1]
has for IEC address : SPCDPCxSBO [0..1]
has for SCADA address : SPC address on SCADA [0..65535]
Scs | Ethernet network | C264 | SPC profile DE
Scs | Ethernet network | C264 | SPC profile SBO
Scs | SPC profile DE
Scs | SPC profile SBO
Apply
Close

FIGURE 69 - RELATION LINK EDITOR WITH OBJECTS LIST

As user could **select more than one object**, the list provides same check boxes seen in tree view, and four new icons:

- Uncheck: which uncheck selected objects,
- Check: which check selected objects,
- Uncheck All: which uncheck all objects of the list,
- Check All: which check all objects of the list.

### 4.2.7 Edit/Reach

Purpose:

- Go to the linked object

Availability:

- Depending on the selected element

Call:

- Contextual menu (Mouse right click) in Navigator, Components List
- Shortcut: Ctrl+G

Operations:

1. Select relation of an object in Navigator
2. Select **Reach** item in the contextual menu:

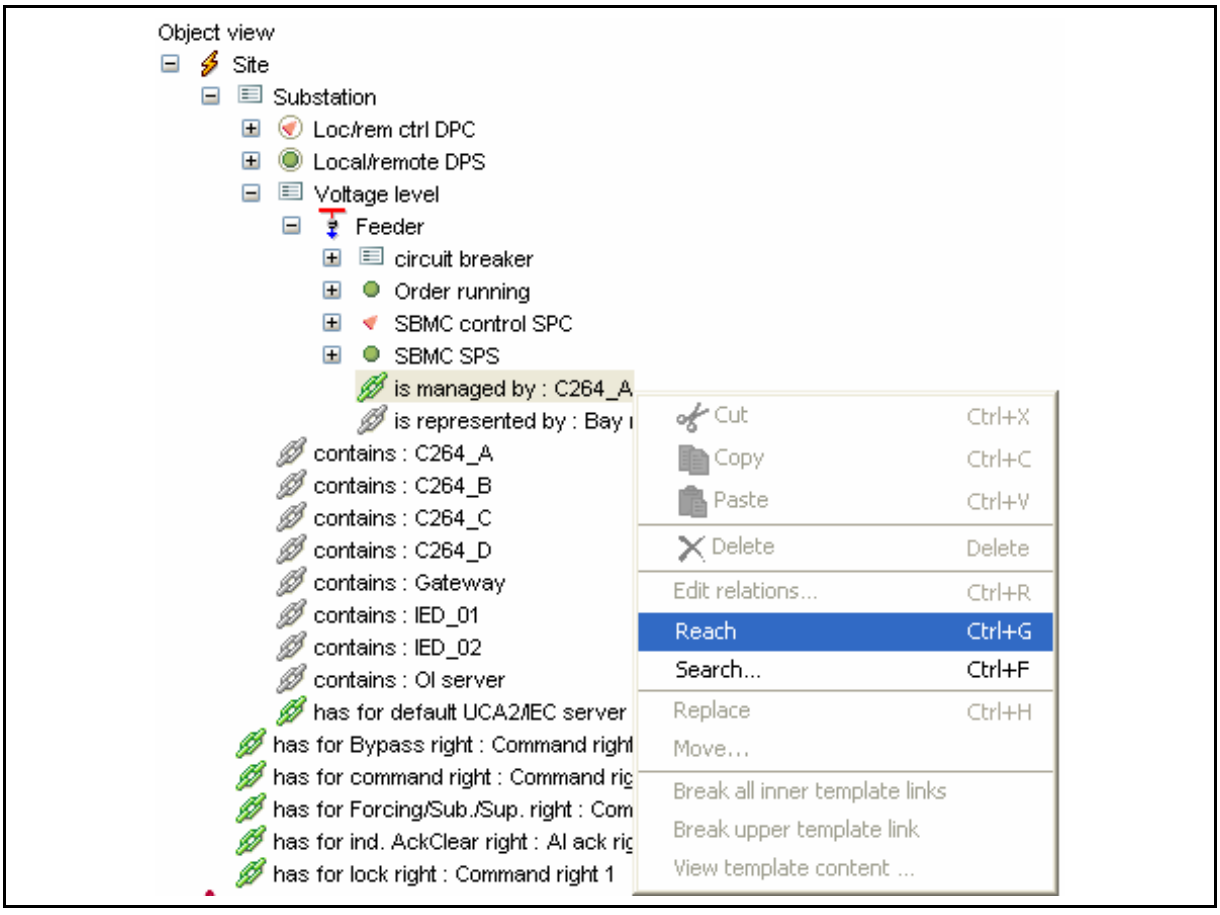



FIGURE 70 - EDIT/REACH ITEM

3. The tree view is elapsed to the linked object. The linked object becomes the current object:

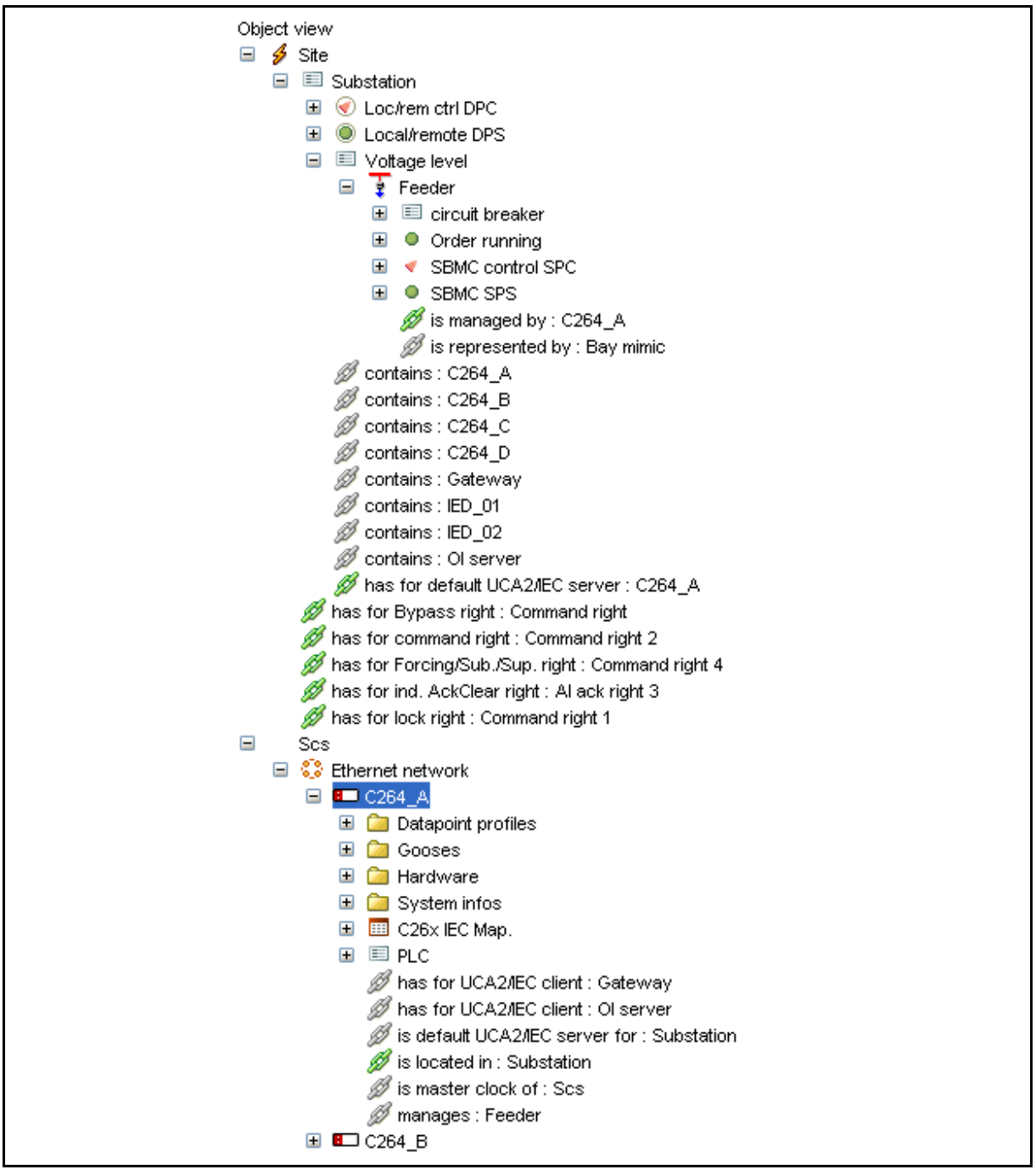



FIGURE 71 - ELAPSE OF NAVIGATOR TO THE LINKED OBJECT

### 4.2.8 Edit/Search…

Purpose:

- Perform **contextual search** on selected element.
- This description (from step 3) remains true for a **global search** which is launched from Tools/Query.
- The query is **performed**:
  - for a **global search**, either on Objects or Templates depending on the selected database mode when the dialog box is launched (Object mode or Template mode).

– for a **contextual search**, only on the selected element and its own components (= all sub tree with the selected object as root).

Availability:

- Depending on the selected element

Other call:

- Contextual menu (Mouse right click) of the selected element in Navigator, Components list
- Shortcut: Ctrl+F

Operation:

1. Select Object from Navigator in configuration database. ( in our example, illustrated by the three following figures the selected object is **Ethernet network**)
2. Select **Search…** menu item.
3. The **Query Manager** dialog box is displayed. It contains two areas:
   – An **Instance Format** containing the **selection of a data type** (Object, Template or Relation) and a sublist of its **Attributes**.
   – A **Filter** optional area allowing to define a **logical constraint** to apply on a selected Attribute.

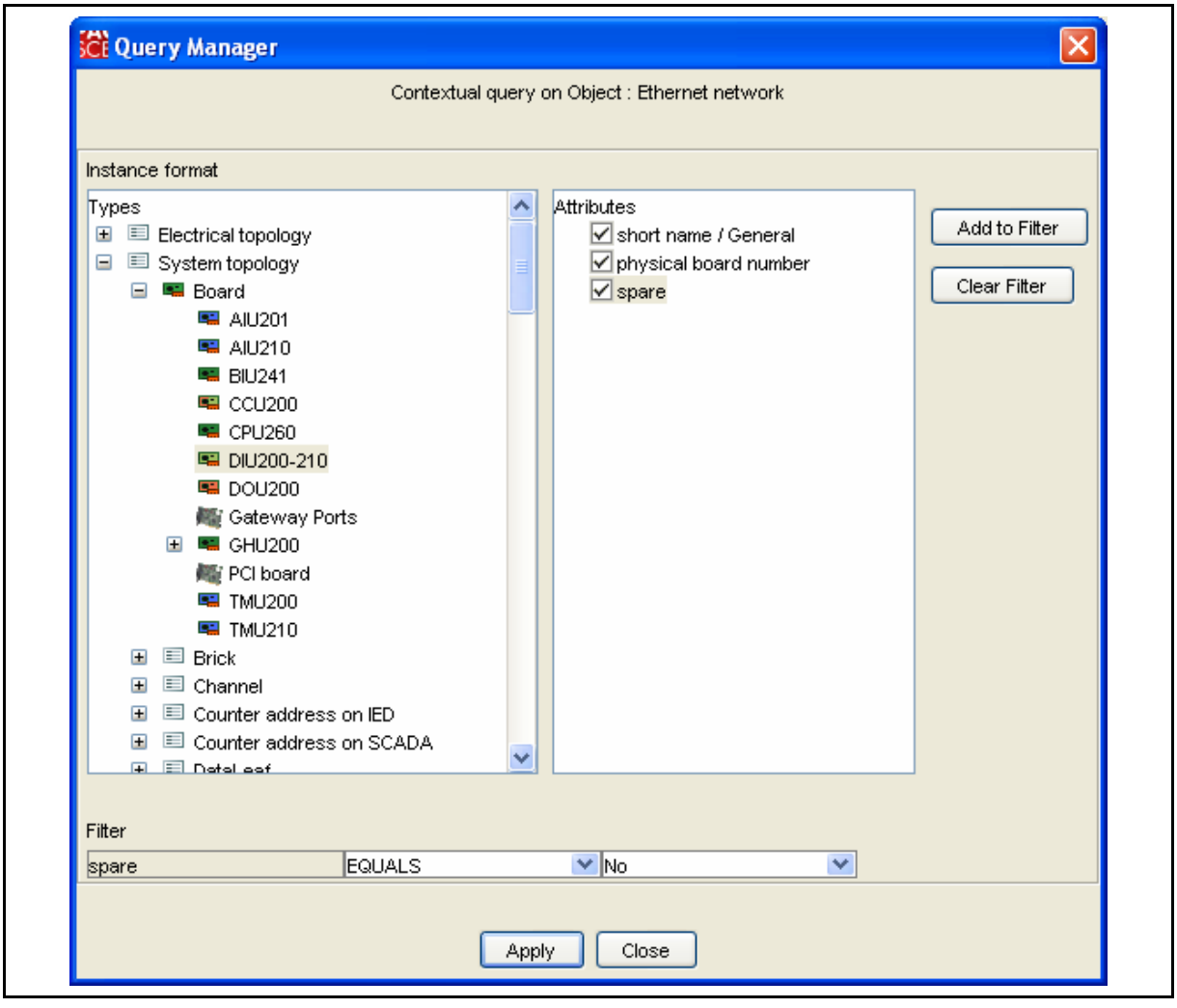



FIGURE 72 - QUERY MANAGER DIALOG BOX

The **Types** browser displays the data types used to create objects, templates and relations in a database. The user has to select one type for the query definition ( In our example the selected data type is a DIU200-210 board)

The **Attributes** browser displays all the attributes available in the definition of the selected type. The user selects all or some of them for the query definition.

The **Filter** area is used to enter a constraint pattern on an attribute to refine the query result. A filter is composed of:

- an attribute identification (its label in the PACiS SCE),
- a query operation ( EQUALS / CONTAINS / STARTS WITH / ENDS WITH / DIFFERENT FROM / GREATER THAN / GREATER OR EQUAL TO / LESS THAN),
- a query value.

In our example the query defined hereabove can be translated by: search in **Ethernet network** object all the **DIU200-210 boards** which have its spare attribute set to **No**.

4. Click the **Apply** button. The query is performed. The **Query result** is displayed in a dialog box with two tabs:
   - **Edit** tab: for displaying the query result table.
   - **Select** tab: for extracting data from the result table by selecting them in a browser. This tab gives access to the Export function (see § 4.6.2 ).

For a contextual query, the short name of the selected element from which the query dialog box was launched is reminded under the box title.

**Edit** tab:

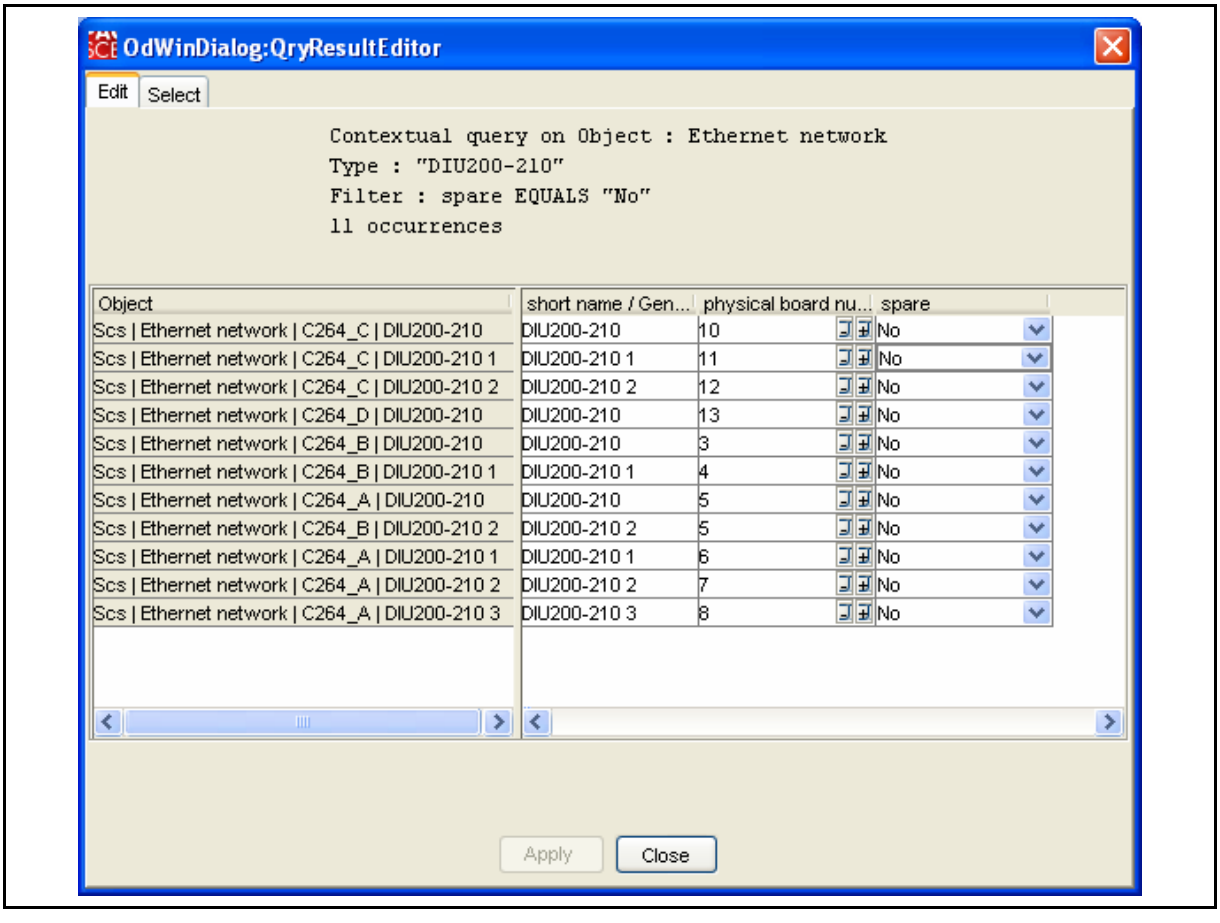

OdWinDialog:QryResultEditor
Edit
Select
Contextual query on Object : Ethernet network
Type : "DIU200-210"
Filter : spare EQUALS "No"
ll occurrences
Object
short name / Gen...
physical board nu...
spare
Scs | Ethernet network | C264_C | DIU200-210 DIU200-210 10 No
Scs | Ethernet network | C264_C | DIU200-210 1 DIU200-210 1 11 No
Scs | Ethernet network | C264_C | DIU200-210 2 DIU200-210 2 12 No
Scs | Ethernet network | C264_D | DIU200-210 DIU200-210 13 No
Scs | Ethernet network | C264_B | DIU200-210 DIU200-210 3 No
Scs | Ethernet network | C264_B | DIU200-210 1 DIU200-210 1 4 No
Scs | Ethernet network | C264_A | DIU200-210 DIU200-210 5 No
Scs | Ethernet network | C264_B | DIU200-210 2 DIU200-210 2 5 No
Scs | Ethernet network | C264_A | DIU200-210 1 DIU200-210 1 6 No
Scs | Ethernet network | C264_A | DIU200-210 2 DIU200-210 2 7 No
Scs | Ethernet network | C264_A | DIU200-210 3 DIU200-210 3 8 No
Apply
Close

FIGURE 73 - QUERY RESULT DIALOG BOX, EDIT TAB

**Lines** are the objects, templates or relations matching the query definition. Their short name path is displayed in the **first column**.

**Following columns** are the selected Attributes.

A **cell** contains the value of an Attribute.

This cell is editable with the same behaviour and the same **constraints as in the Attributes Editor**.

The modification of the Attribute value is enabled only if the database is not open in read-only mode and if the Attribute is not read-only because of the User Profile rights, the structural database locks, or the DOF status.

When an attribute value is modified an icon appears in its cell, and its previous value can be restored.

A **contextual menu** is available on each attribute to **copy, cut, paste, restore, or increment** the value.

The multi-selection of cells is also available for cells modifications.

All the modifications are stored in database when the **Apply** button is clicked. If some modification cannot be applied to the database because of error, the modification icon remains displayed in the cell.

**Select** tab:

A **browser** displays the objects (or templates) retrieved by the performed query.

Each object (or template) can be checked or not, to be available or not, in the export.

A **contextual menu** is available on each item of the browser with the following options:

- Select to check the box of the selected it.
- Unselect to uncheck the box of the selected item.
- Select all children to automatically check all the boxes of the sub-items of the selected item.
- Unselect all children to automatically uncheck all the boxes of the sub-items of the selected item.

The **Export** button saves the selected data into an xml file.

The **Close** button closes the query result dialog box.

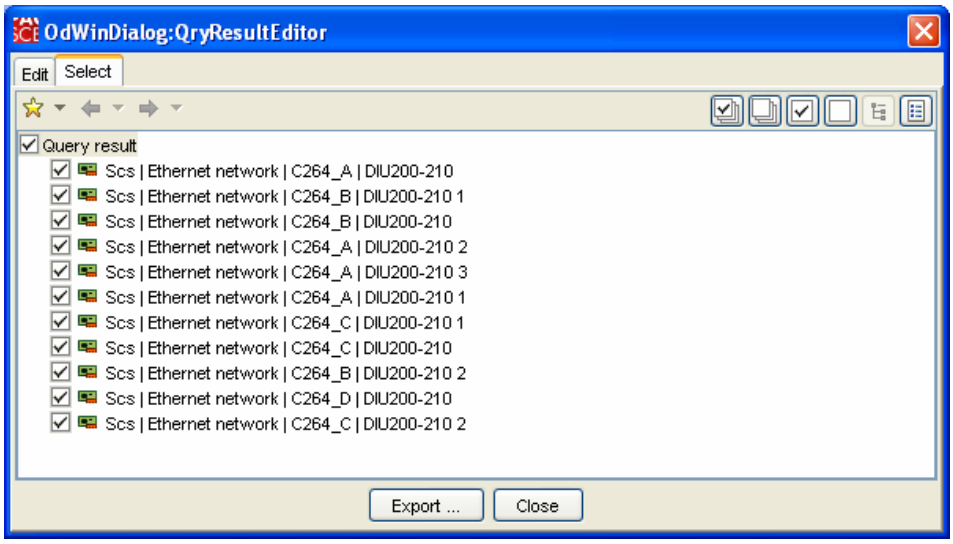

OdWinDialog:QryResultEditor
Edit
Select
Query result
Scs | Ethernet network | C264_A | DIU200-210
Scs | Ethernet network | C264_B | DIU200-210 1
Scs | Ethernet network | C264_B | DIU200-210
Scs | Ethernet network | C264_A | DIU200-210 2
Scs | Ethernet network | C264_A | DIU200-210 3
Scs | Ethernet network | C264_A | DIU200-210 1
Scs | Ethernet network | C264_C | DIU200-210 1
Scs | Ethernet network | C264_C | DIU200-210
Scs | Ethernet network | C264_B | DIU200-210 2
Scs | Ethernet network | C264_D | DIU200-210
Scs | Ethernet network | C264_C | DIU200-210 2
Export ...
Close

FIGURE 74 - QUERY RESULT DIALOG BOX, SELECT TAB

### 4.2.9 Edit/Switch Mode

Purpose:

- Switch between Object mode and Template mode.

Availability:

- Always

Other call:

- Toolbar

Operations:

1. Select switch mode item:
   - in **Object mode**, the **navigator** displays the complete object configuration and the current selected object;

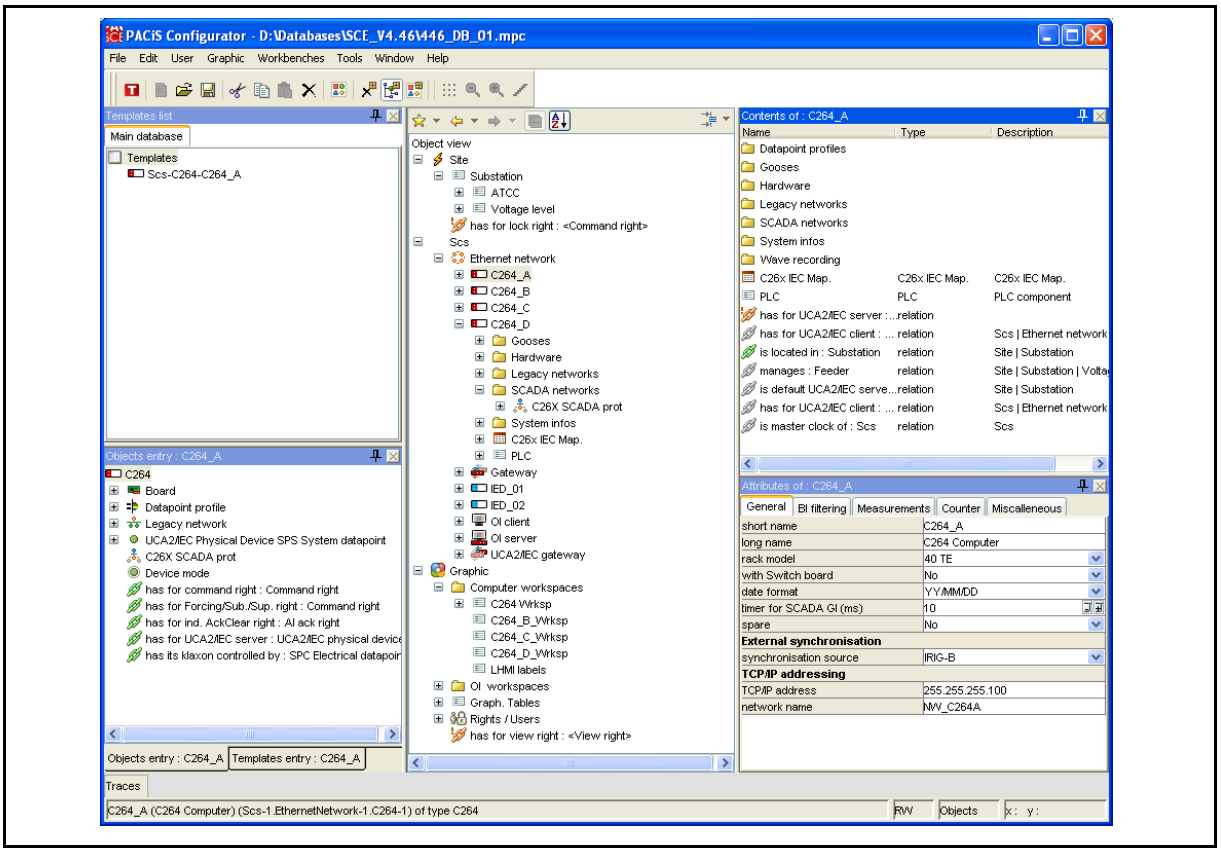



FIGURE 75 - OBJECT MODE

   - in **Template mode**, the **navigator** displays the selected template of **Templates list area**;

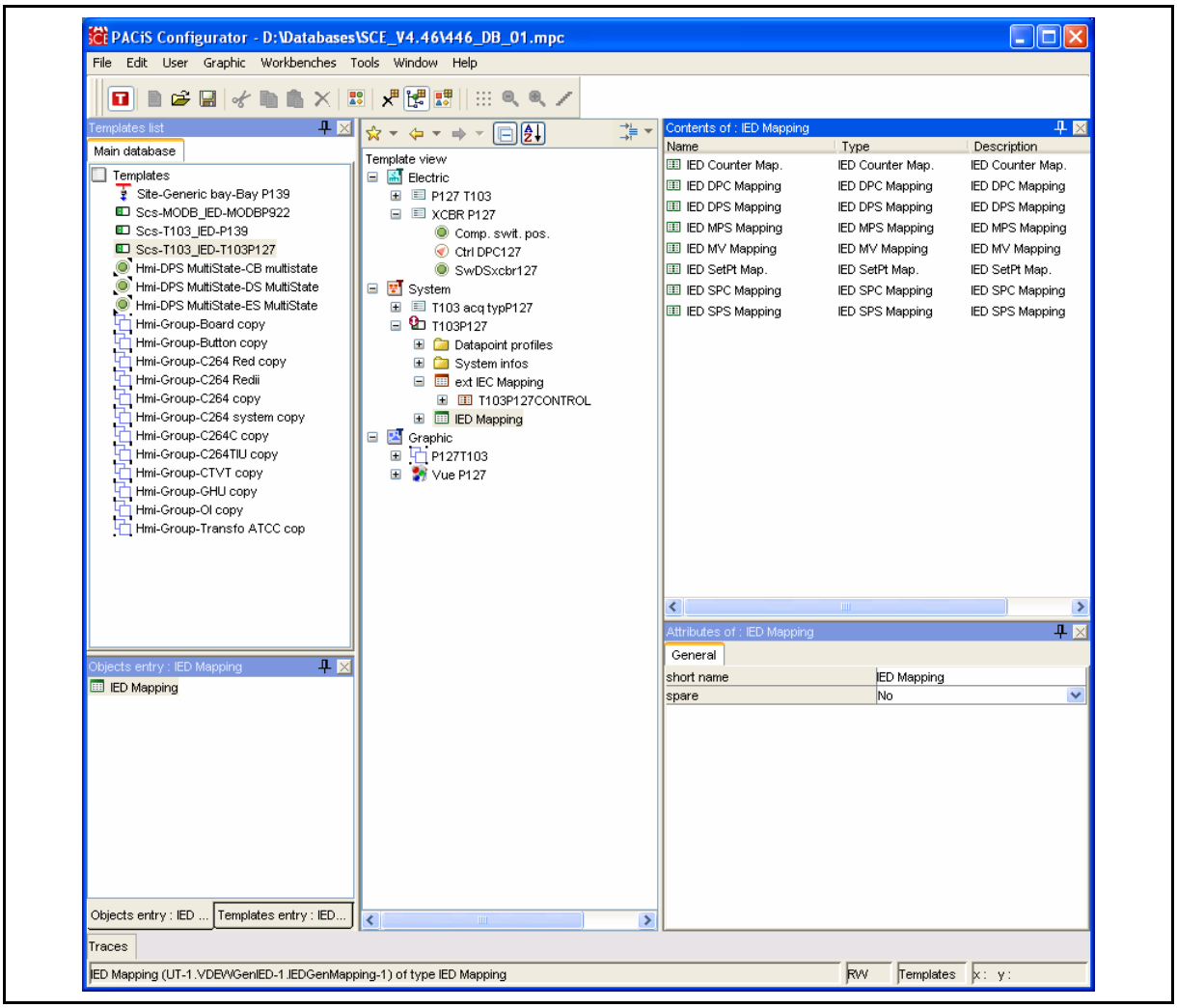



FIGURE 76 - TEMPLATE MODE

– for Template mode and Object mode, the **other areas** are updated in accordance with the current selection of the navigator.

2. switch again: the current selection of template or object is saved.

4.2.10 Move

Purpose:

- Move an object. Same behaviour as a sequence cut/paste, with a modal editor. This editor allows to choose the new parent of the object.

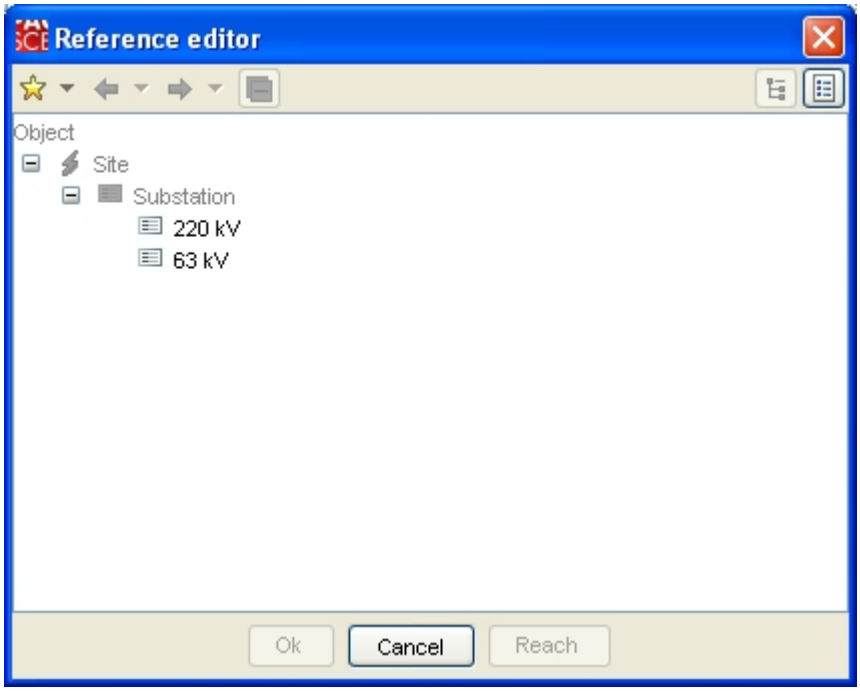



FIGURE 77 - EDIT/MOVE DIALOG BOX

Availability:

- Depending on the selected element and associated conditions

Call:

- Contextual menu (Mouse right click) in Navigator and Components list.

4.2.11 Replace

Purpose:

- Replace the selected object by the content of the clipboard if objects are compatible

Availability:

- Context dependant

Call:

- Shortcut: Ctrl+H
- Contextual menu (Mouse right click) in Navigator and Components list.

4.2.12 Add

Purpose 1:

- In a working database, add the Templates/Objects Entry selected element as a child of the active Navigator element

Purpose 2:

- Add the Second Templates List selected Unified Template to the main database

Availability:

- Context dependent

Call:

- Contextual menu (Mouse right click) in Entry helper or Template list area (second database tab)
- Double-click on element to add

Operating 1:

1. Select object in navigator area
2. Select template into **template entry** or **object entry** automatically corresponding to navigator selected object

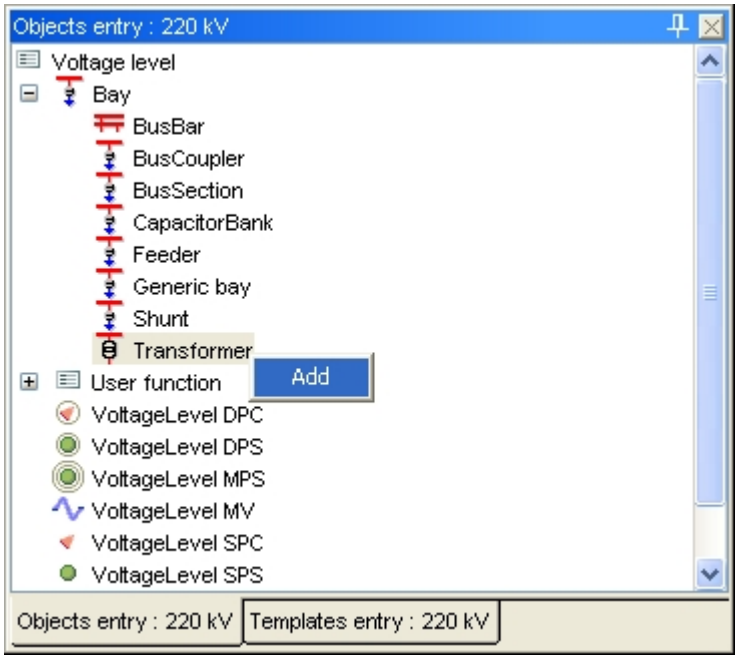



FIGURE 78 - EDIT/ADD IN OBJECT/TEMPLATE ENTRY AREA

3. Make Edit/Add or right mouse click or double-click.
4. Added object is put under navigator selected object.

Operating 2:

1. Select a template in **second database** tab in Template list area.
2. Choose Edit/Add or right mouse click or double-click.

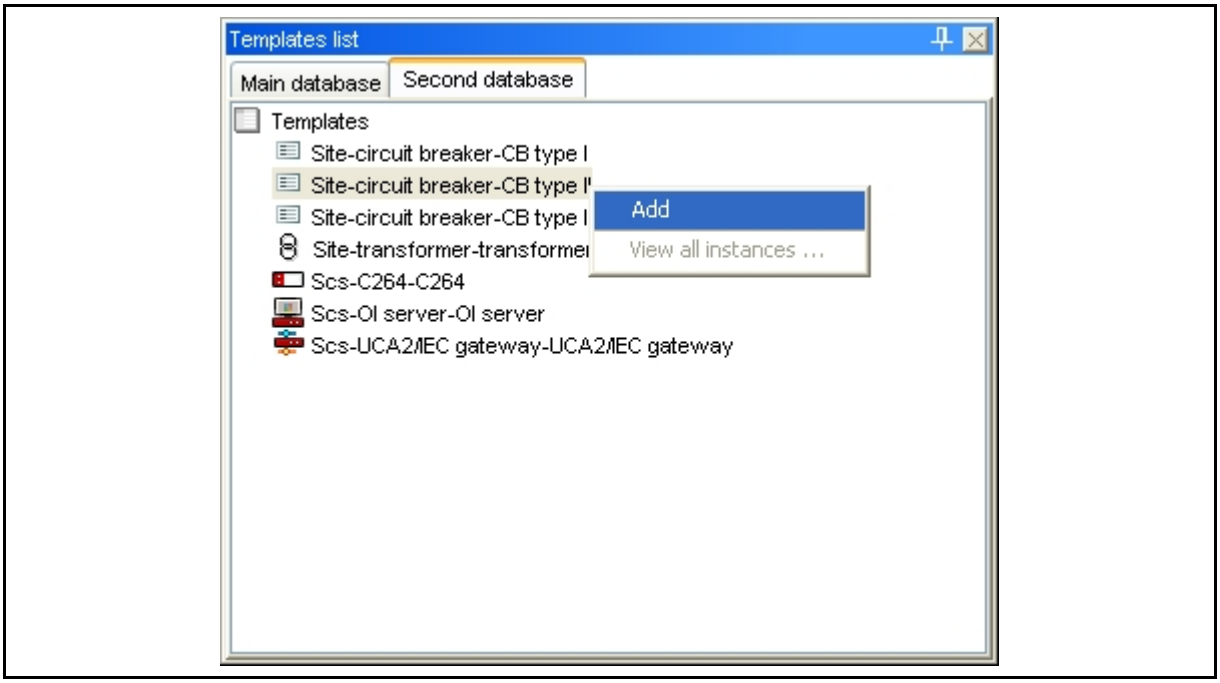



FIGURE 79 - EDIT/ADD IN TEMPLATES LIST AREA

3. Selected template is copied from template library (second database) to the current database.

### 4.2.13 Duplicate

Purpose:

- In Templates list area, duplicate (copy/paste) the selected template.

Availability:

- Template mode is selected.
- Template is selected in Templates list area.
- Database is opened in read/write mode (working database).

Call:

- Contextual menu (Mouse right click) in templates list area

Operation:

1. Select a template in Templates list area.
2. Choose duplicate item. The selected template is cloned in the Templates list.

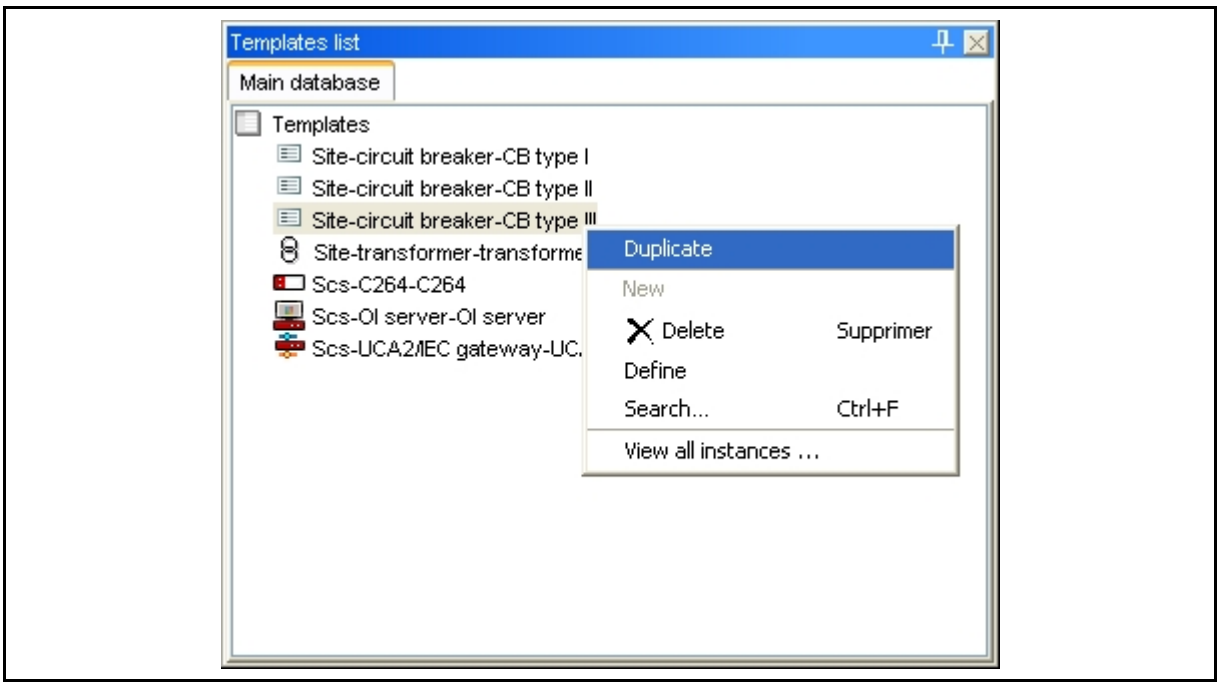



FIGURE 80 - EDIT/DUPLICATE IN TEMPLATES LIST AREA

### 4.2.14 Canonic Form

Purpose:

- View an **FBD interlock equation** in **two forms** (developed and factorised). It is used to visualise all the content of the logical equation selected into a normalised view (sum of products) and into the original view (factorised). See the example below.
- The view is divided in **two parts**, one to represent **the whole automation diagram** and one two represent **the developed equations** which will be generated to implement the automatism. The developed equation is displayed in **PACiS OI when a control is refused** because of interlocks.
- The development of an equation must generate much combinations of operands that can be easily **simplified using basic Morgan rules** (e.g.: A AND A = A, A OR A = A, A AND NOT(A) = 0), so the resulting developed equation can be lighter than the factorised. More, if all the operands are cancelled, the developed equation displayed is empty, revealing that the original equation contains a conception mistake.

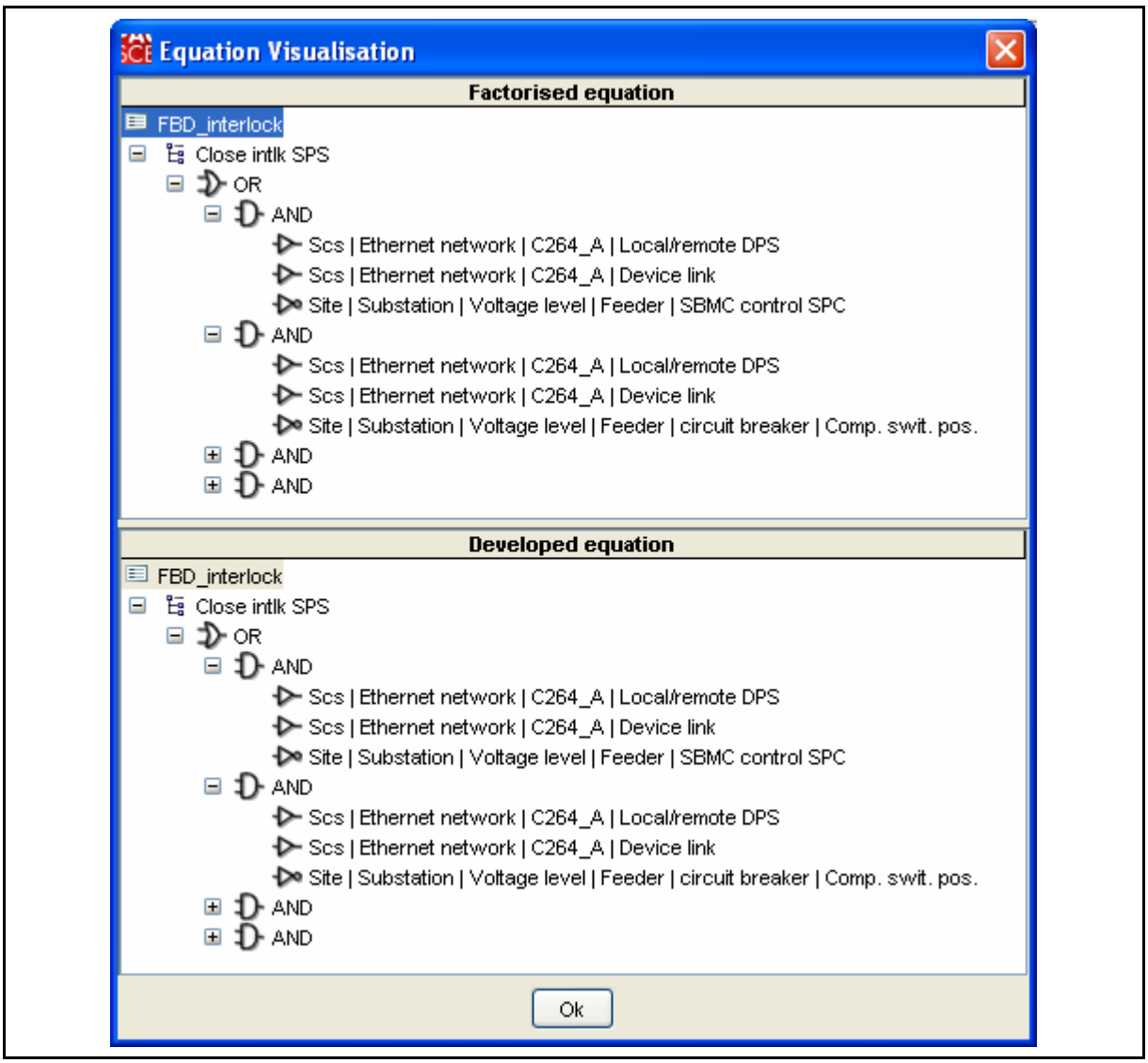

Equation Visualisation
Factorised equation
FBD_interlock
Close intlk SPS
OR
AND
Scs | Ethernet network | C264_A | Local/remote DPS
Scs | Ethernet network | C264_A | Device link
Site | Substation | Voltage level | Feeder | SBMC control SPC
AND
Scs | Ethernet network | C264_A | Local/remote DPS
Scs | Ethernet network | C264_A | Device link
Site | Substation | Voltage level | Feeder | circuit breaker | Comp. swit. pos.
AND
AND
Developed equation
FBD_interlock
Close intlk SPS
OR
AND
Scs | Ethernet network | C264_A | Local/remote DPS
Scs | Ethernet network | C264_A | Device link
Site | Substation | Voltage level | Feeder | SBMC control SPC
AND
Scs | Ethernet network | C264_A | Local/remote DPS
Scs | Ethernet network | C264_A | Device link
Site | Substation | Voltage level | Feeder | circuit breaker | Comp. swit. pos.
AND
AND
Ok

FIGURE 81: - EDIT/CANONIC FORM

Availability:

- on FBD interlock object

Call:

- Contextual menu (Mouse right click) in Navigator, Components List

Operating:

1. Select in navigator area under process part, FBD object
2. Select Canonic form item
3. Pop up appears to see two forms of the equation

Equation is shown in factorised (compact) and developed (uniqueness ) format in Tree Viewer where each node replaces the factorisation ( ). Except for NOT, all terms are displayed in list below given operator.

Operators are:

| | |
|---|---|
| | Data Point Input |
| | Not Operator |
| | OR operator |
| | AND Operator |
| | NOR Operator |
| | NAND Operator |
| | XOR Operator |
| | NotXOR Operator |

### 4.2.15 Break All Inner Template Link

Purpose:

- In Object mode, break the link between an object which is an instance of template and this template. Any template modification does not impact anymore the object. Object attributes and its component can be modified. If this instance of template contains another instances of template (inner templates), their template links are also broken.

Availability:

- On an instantiated template

Call:

- Contextual menu (Mouse right click) in Navigator, Components List

Operations:

1. Select an object which is an instance of a template. This object must be the root anchor of template:

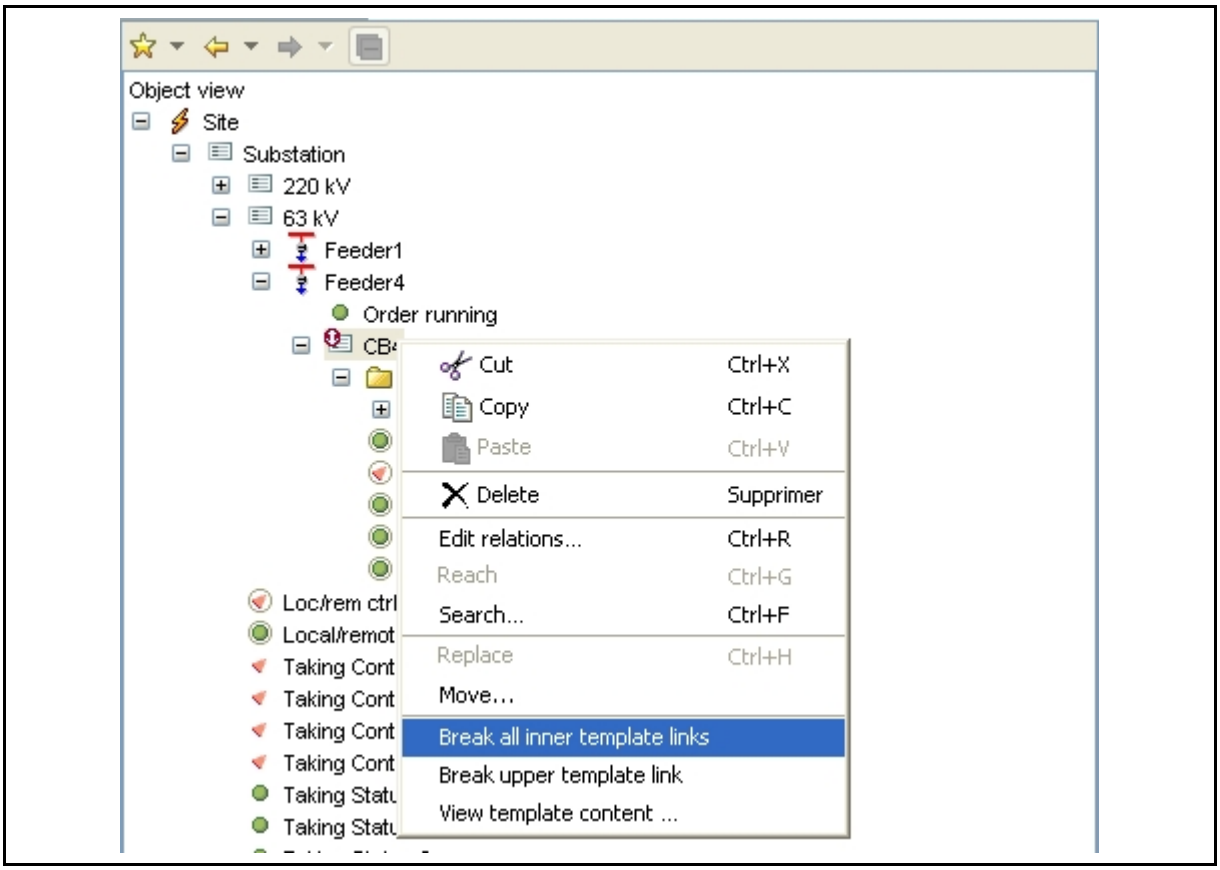



FIGURE 82 - EDIT/BREAK ALL INNER TEMPLATE LINKS

2. Choose Break all inner template link item. A confirmation dialog box appears: this message indicates that this selected object is concerned by the operation but also the others components of the template. Click on Yes/Oui to continue the operation. A click to No/Non cancels the operation.

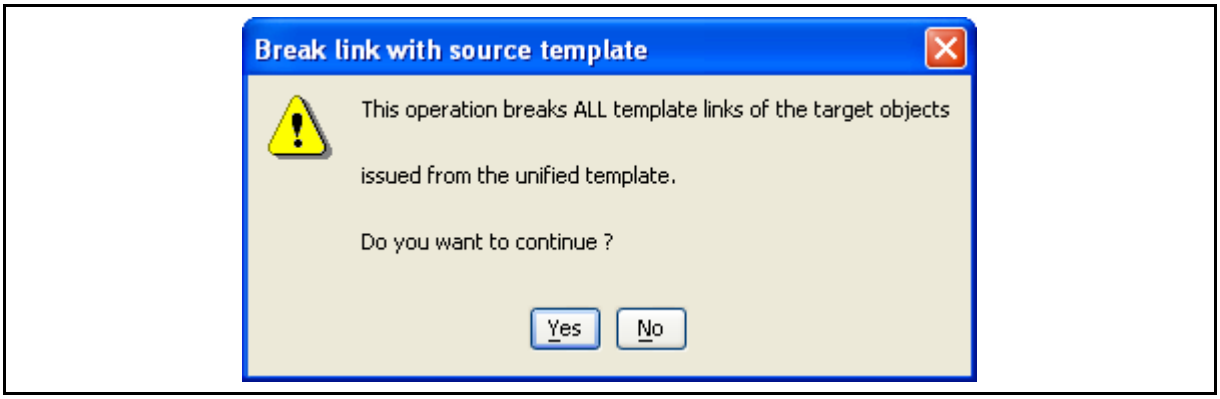

Break link with source template
This operation breaks ALL template links of the target objects
issued from the unified template.
Do you want to continue ?
Yes
No

FIGURE 83: EDIT/BREAK TEMPLATE LINK CONFIRMATION

3. The link with its template is broken. Its icon becomes normal object icon. All attributes becomes RW and its components could be edited: add, remove a component.

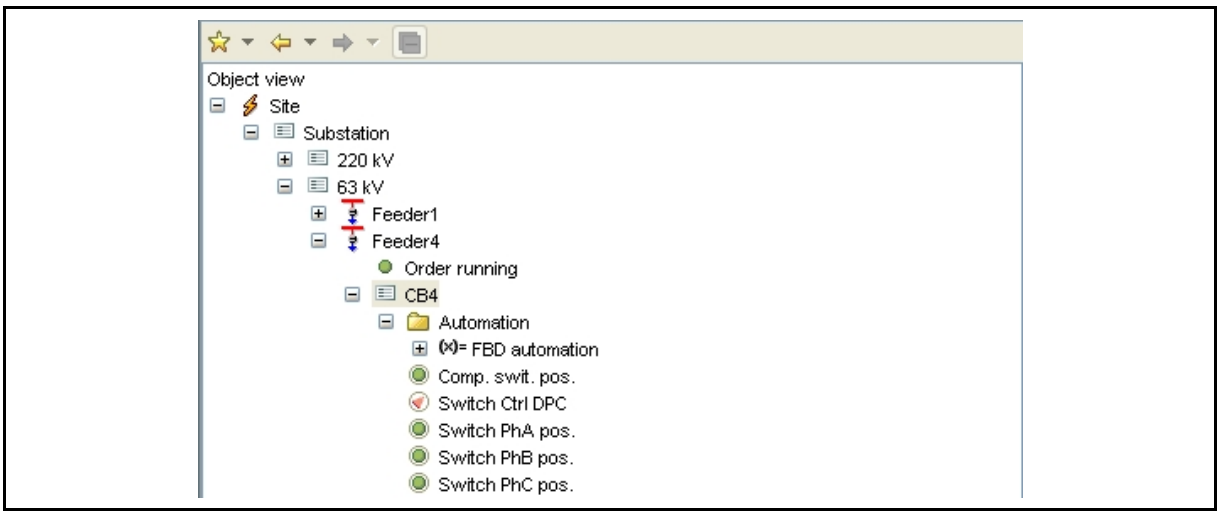



FIGURE 84 - EDIT/ALL TEMPLATE LINKS HAVE BEEN BROKEN

### 4.2.16 Break Upper Template Link

Purpose:

- In Object mode, break the link between an object which is an instance of a template and this template. Any template modification does not impact anymore the object. Object attributes and its component can be modified. If this instance of template contains other instances of template (inner templates), their template links are kept. So only the upper level of template is concerned by this action.

Availability:

- On an instantiated template

Call:

- Contextual menu (Mouse right click) in Navigator, Components List

Operations:

1. Select an object which is an instance of a template. This object must be the root anchor of template:

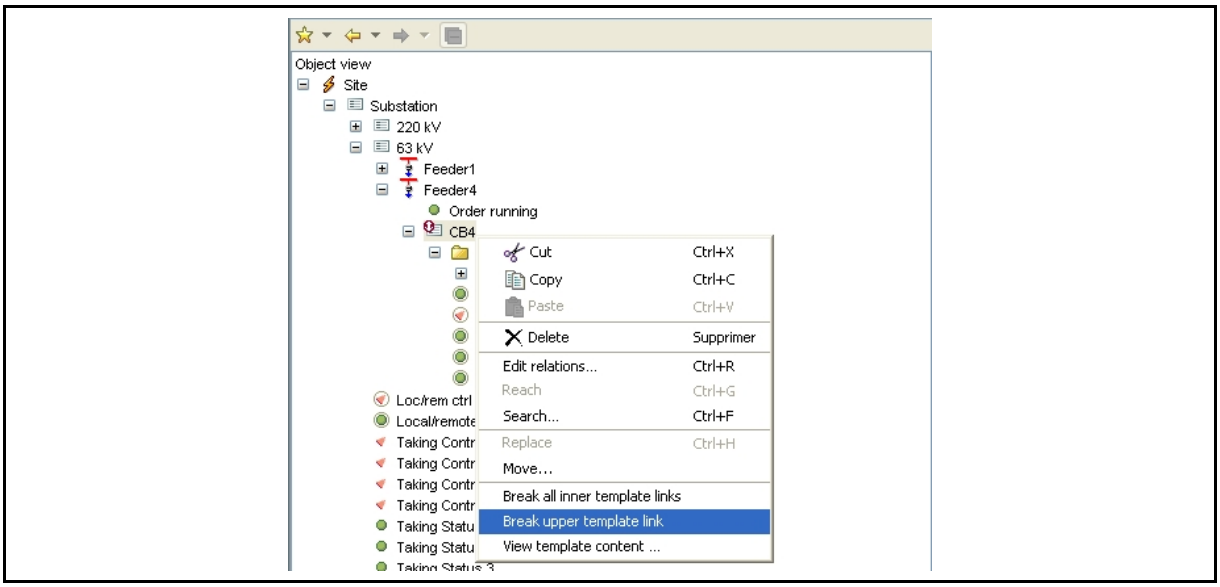



FIGURE 85: EDIT/BREAK UPPER TEMPLATE LINK

2. Choose Break upper template link item. A confirmation dialog box is displayed: this message indicates that this selected object is concerned by the operation but also the others components of the template. Click on Yes to continue the operation. A click on No cancels the operation.

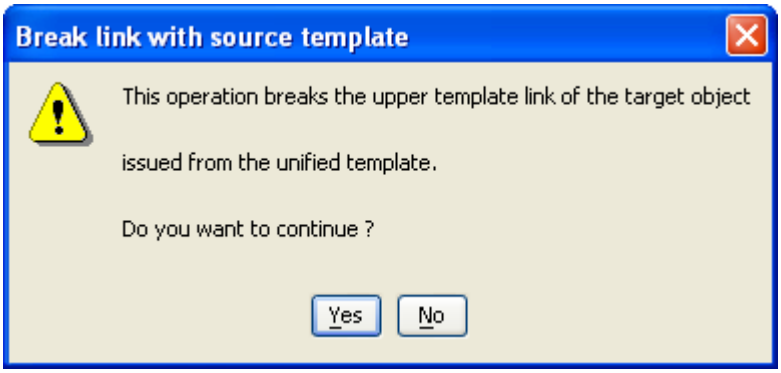

Break link with source template
This operation breaks the upper template link of the target object
issued from the unified template.
Do you want to continue ?
Yes
No

FIGURE 86: EDIT/BREAK TEMPLATE LINK CONFIRMATION

The link with its template is broken. Its icon becomes normal object icon. All attributes becomes RW and its components could be edited: add, remove a component. The inner instances of templates are not updated.

### 4.2.17 View Linked Attributes

Purpose:

- In object mode or template mode, view the linked attributes to a Parameter

Availability:

- An attribute which is linked to a parameter or a parameter must be selected. The parameters of template are available inside tab Parameters with Attributes Editor when the root anchor of template is selected in Navigator.

Call:

- Contextual menu (Mouse right click) in Attributes Editor

Operations:

1. Select a parameter or an attribute which is linked to a parameter

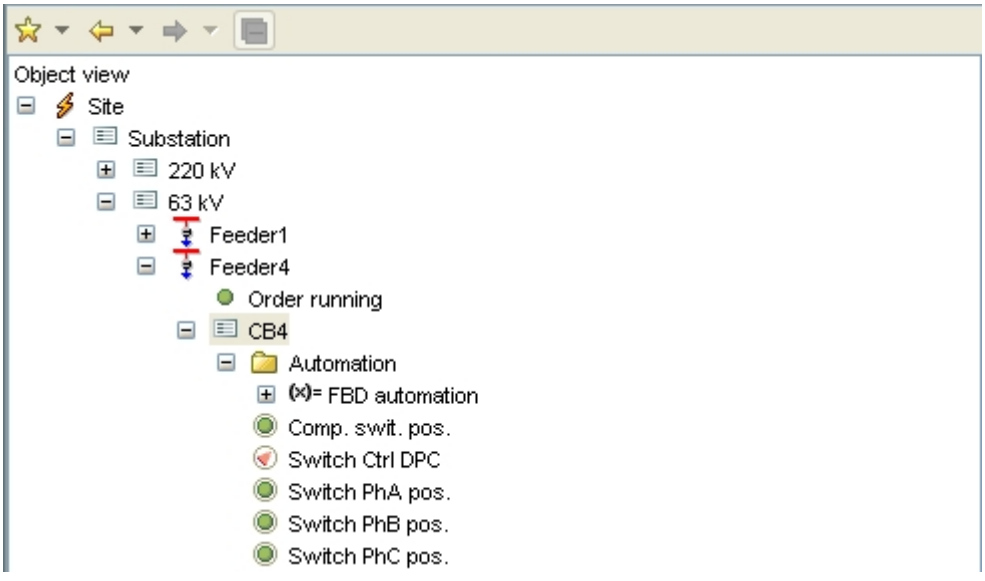



FIGURE 87 - EDIT/VIEW LINKED ATTRIBUTES

2. Choose view linked attributes: all attributes linked to the selected parameter are displayed in the following dialog box:

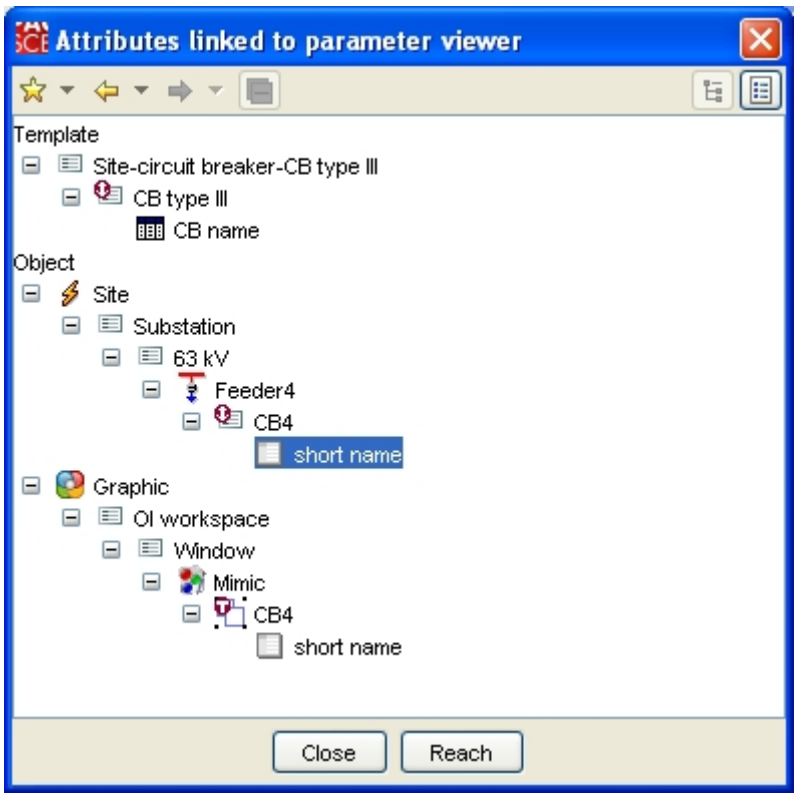



FIGURE 88 - TREE OF LINKED ATTRIBUTES

3. A list form is available with button:
Attributes linked to parameter viewer
.CB name
Site | Substation | 63 kV | Feeder4 | CB4.short name
Graphic | OI workspace | Window | Mimic | CB4.short name
Close
Reach

FIGURE 89 - LIST OF LINKED ATTRIBUTES

4. The **Reach** button allows to elapse the navigator to the selected object and to select in the Attribute editor the selected attribute.

### 4.2.18 View Template Instances

Purpose:

- View the instances of the selected template

Availability:

- Depending on the selected element

Call:

- Contextual menu (Mouse right click) in Templates List, Templates Entry.

Operations:

1. Select a template in Templates list area or in Template entry area

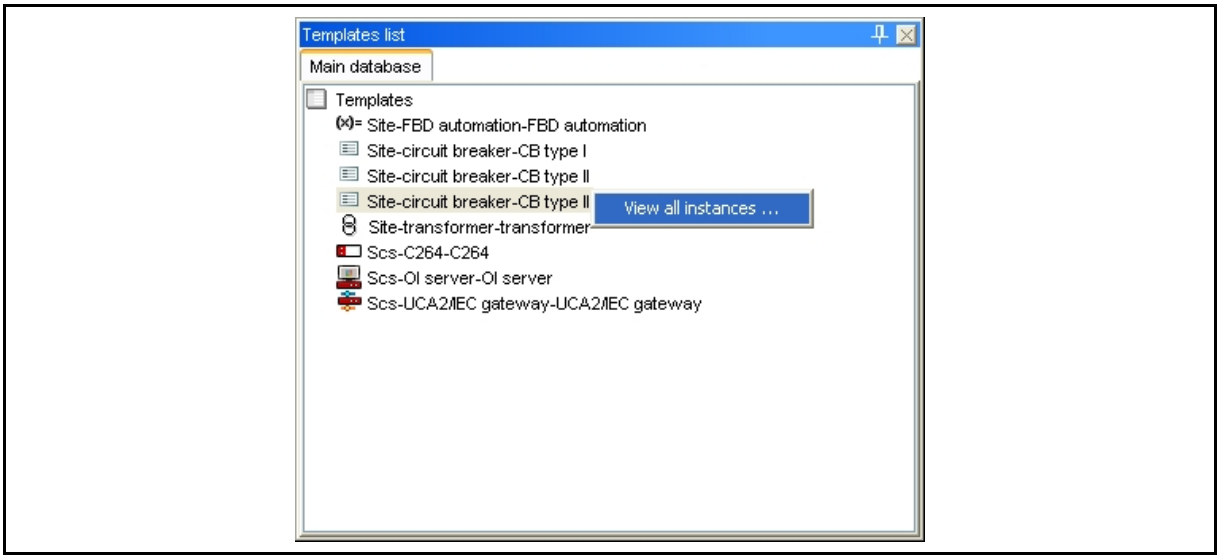



FIGURE 90 - EDIT/VIEW ALL INSTANCES

2. Choose View template instances item. This dialog box appears:

The content of the tree show all instances of the selected template in template list or template entry. Only main object of the template are shown and where it's instantiated.

A list form is available.

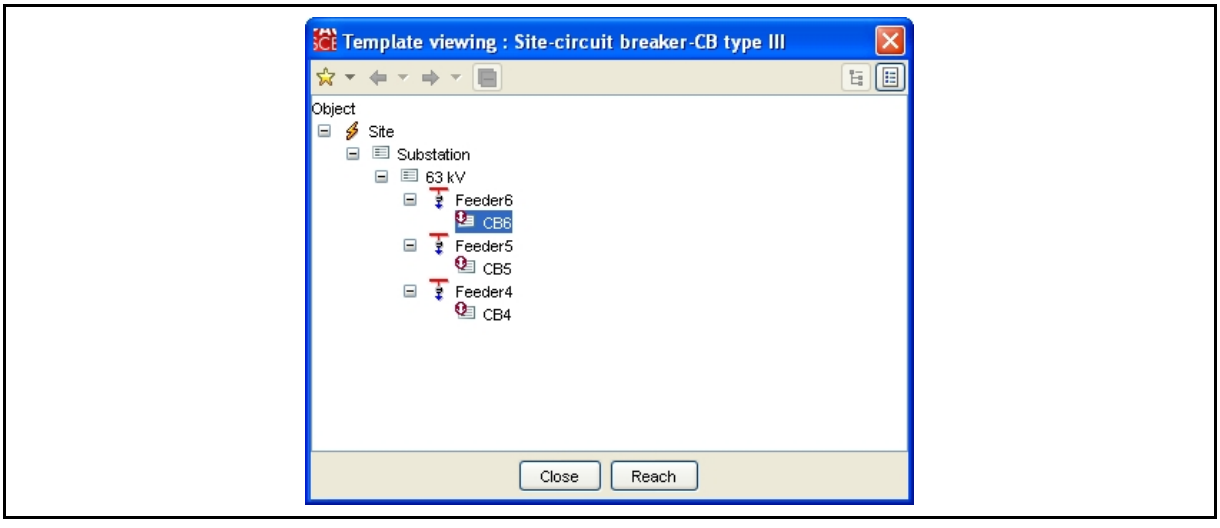



FIGURE 91 - TEMPLATE INSTANCES

### 4.2.19 View Template Content

Purpose:

- View all components of a template instance. This feature is useful if the template has several components: graphic, electric or system.

Availability:

- Depending on the selected element

Call:

- Contextual menu (Mouse right click) in Navigator, Components List

Operations:

1. Select a component of a template instance, the template anchor or any other component of the template instance:

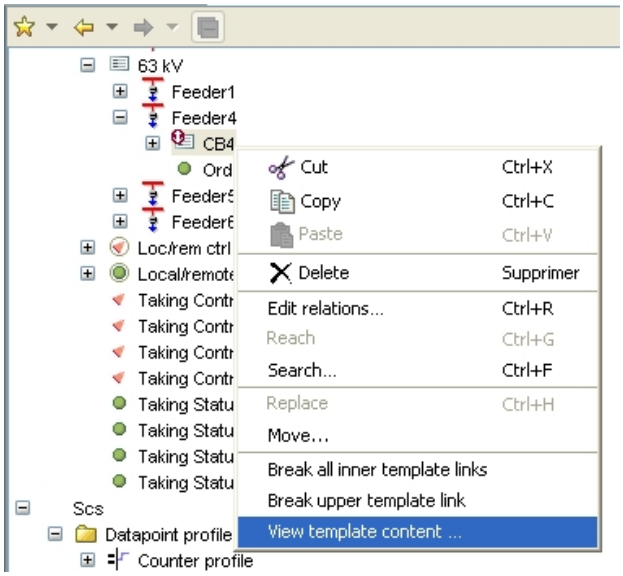



FIGURE 92 - EDIT/VIEW TEMPLATE CONTENT

2. Choose View template content item. This following dialog box appears:

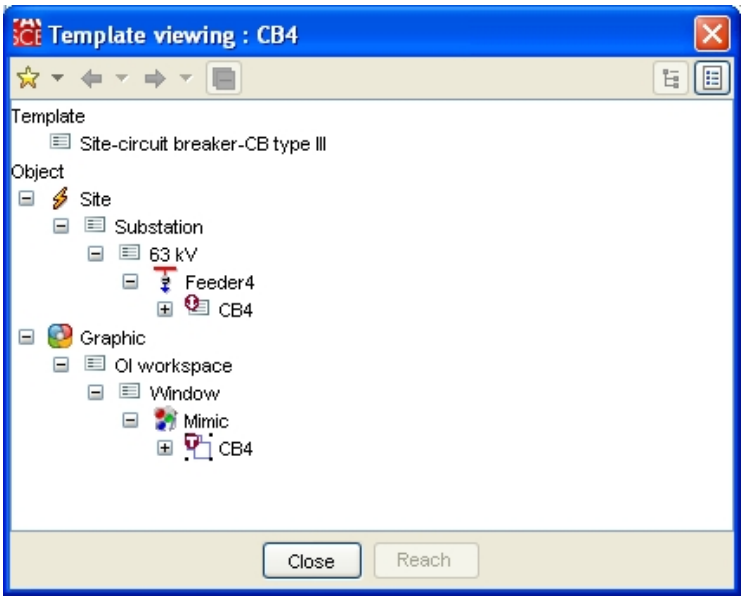



FIGURE 93 - TEMPLATE VIEWING

In **tree view**:

- template part shows the original template,
- objects part shows all components of the template instance.

The **Reach** button allows to browser the selected object in Navigator.

An object **list view** is also available with .

4.2.20 Create Backup

Purpose:

- **Create a backup device** for an IEC61850 device C264 or OI: for redundant equipment, clone the equipment as a backup and associate the created backup to its existing main equipment. This association is done with a specific relation “has for backup:”.
- Backup equipment is **read-only**. So, user can’t create, modify or delete any thing inside it. The read only state is displayed with a different icon, like templates.
- The only possibility of **change** is **system information**, like TCP/IP address and network name.
- The cloned information in backup equipment is the system datapoint which can be **used in a system mimic** definition to animate the states of the backup.
- **A complementary description** of this feature is done in **chapter Application** of PACiS C264 and PACiS OI.

Availability:

- Depending on the selected element

Call:

- Contextual menu (Mouse right click) in Navigator, Components List

Operations:

1. Select an equipment which can be redounded yet: C264 and OI Server.
2. Choose Create Backup item:

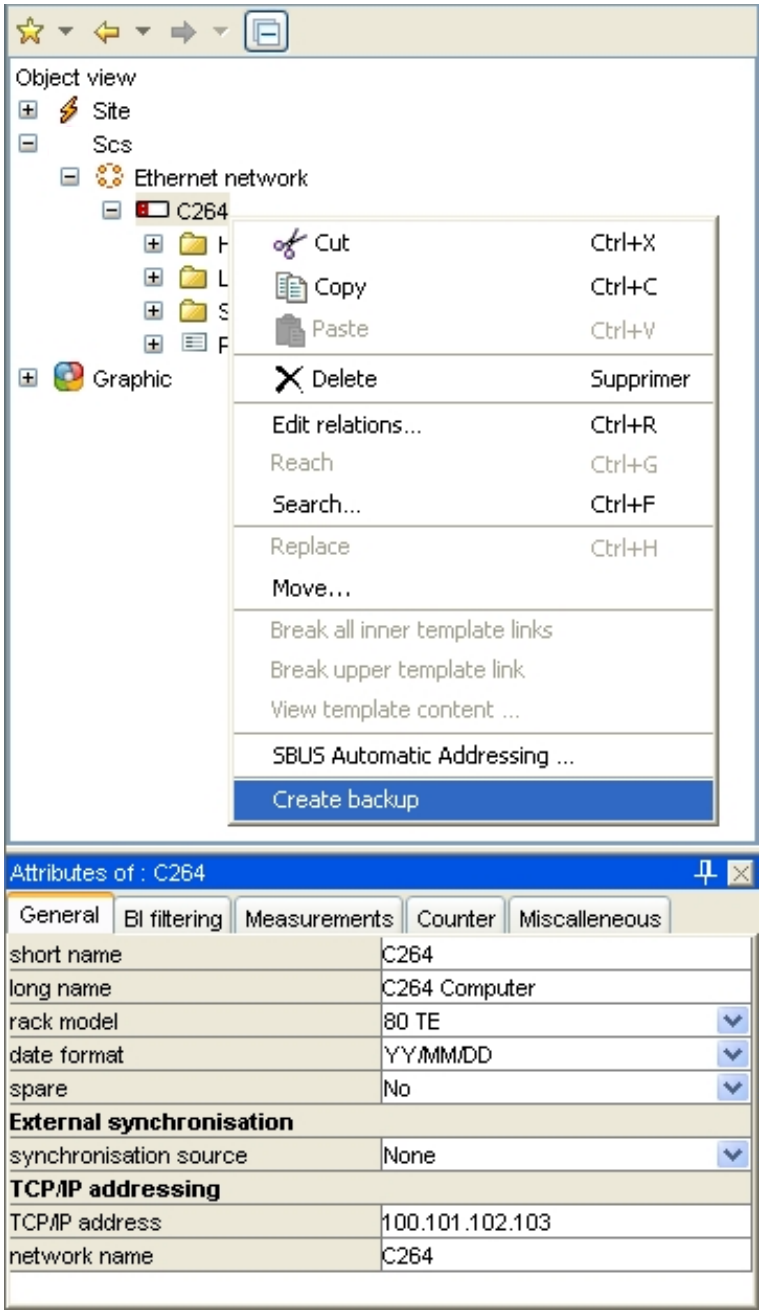



FIGURE 94 - EDIT/CREATE BACKUP

3. The selected equipment is cloned. A new relation between the two equipment is created: “is backup of”. Its components are read-only except its name or network attributes:

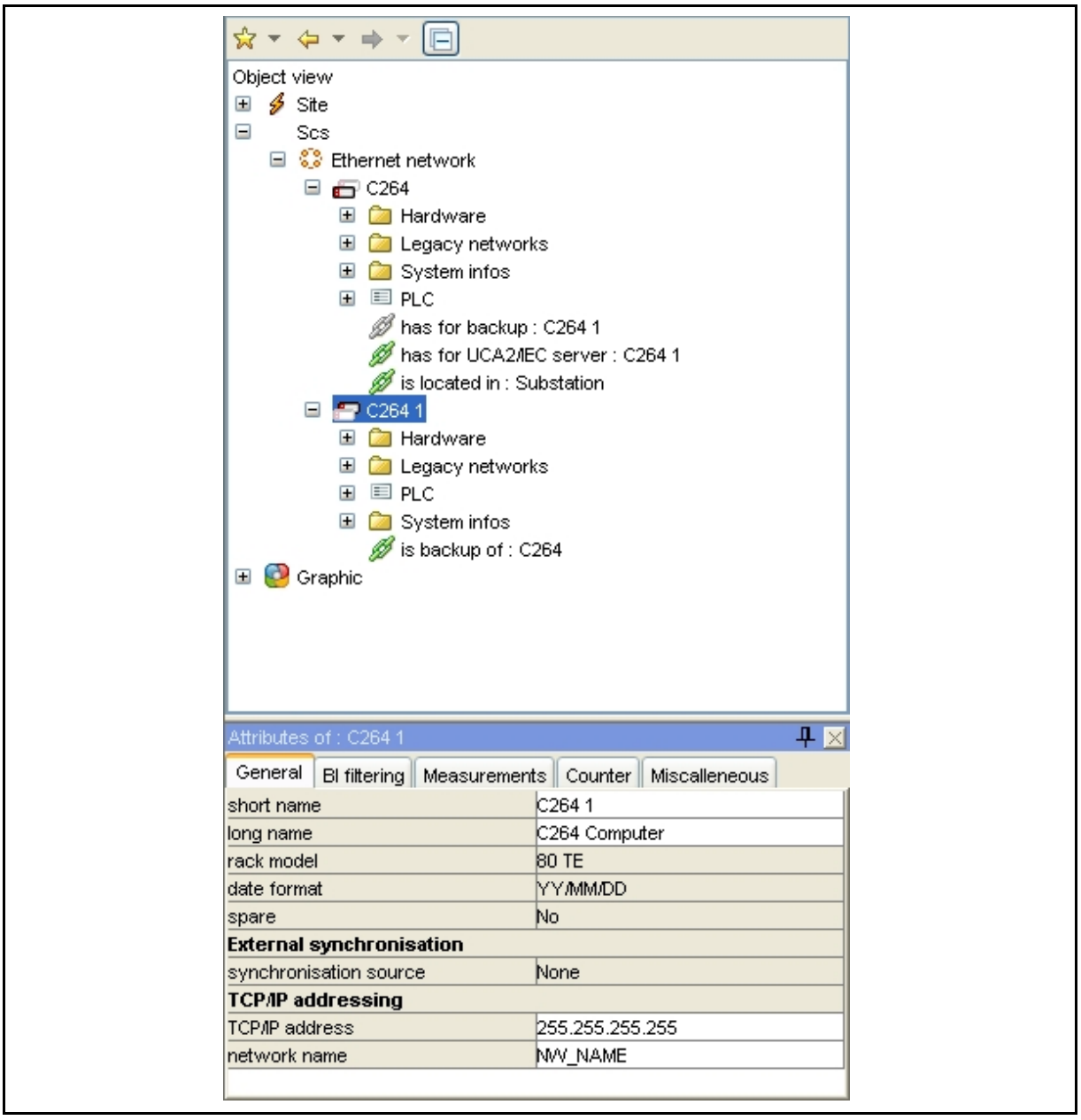



FIGURE 95 - A BACKUP EQUIPMENT

4.2.21 New

Purpose 1:

- Create a new Unified Template

Purpose 2:

- Create a new Parameter in the selected Unified Template

Availability:

- Depending on the selected element

Call:

- Contextual menu (Mouse right click) in Attributes Editor (Parameter tab), Templates List

Operation 1:

1. Only in **template mode**, select the **root of Templates list** area and choose New item:

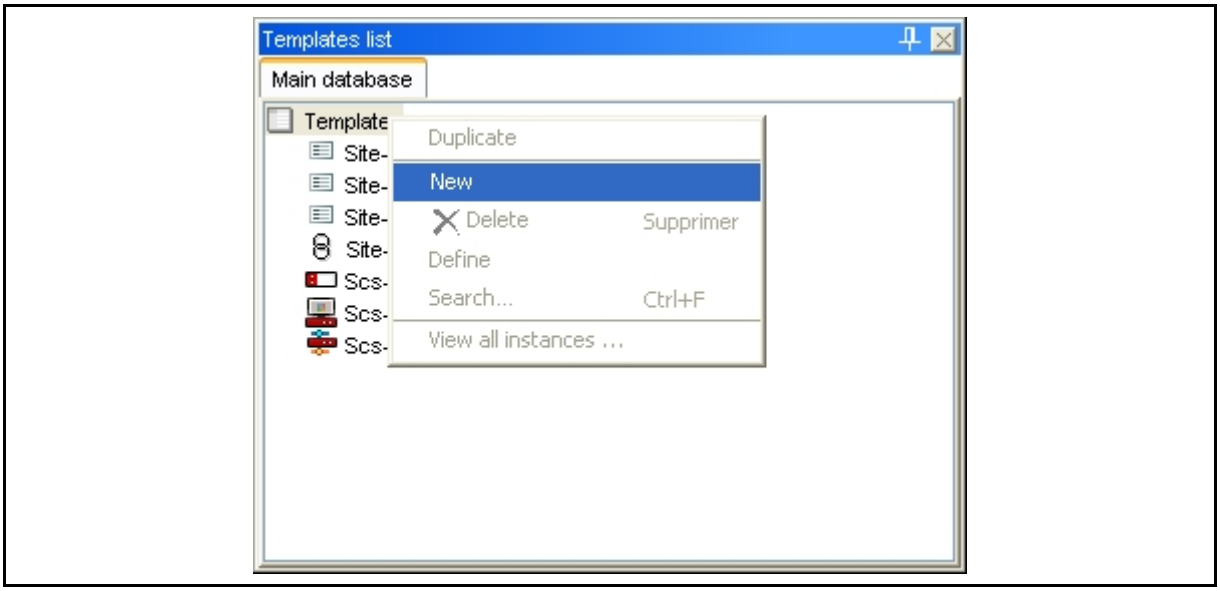



FIGURE 96 - EDIT/NEW TEMPLATE

2. A new template is created with a default name. Its name will be set after the creation of its first component: the first created component of a template is the anchor of the template. The name of the template is the name of its anchor. An anchor is the object from which the template can be instantiated.

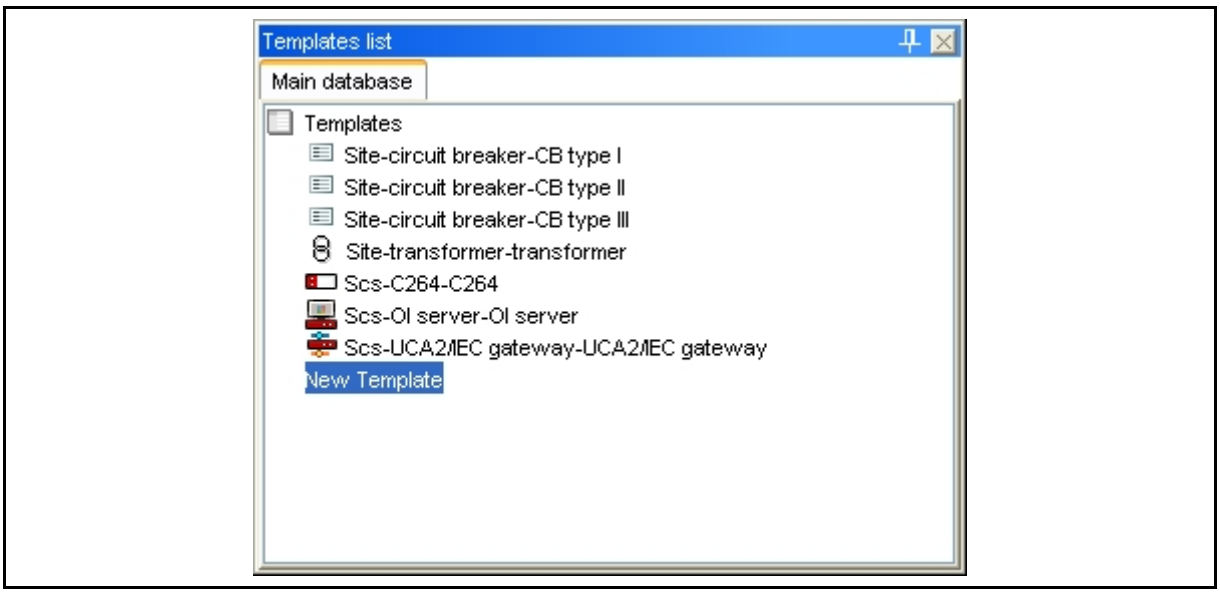



FIGURE 97 - A NEW TEMPLATE

Operation 2:

1. Only in template mode:
   - select a template in Templates list,
   - then select the **anchor** of a template in Navigator,
   - then select the **parameter tab** in Attribute editor. Choose New item:

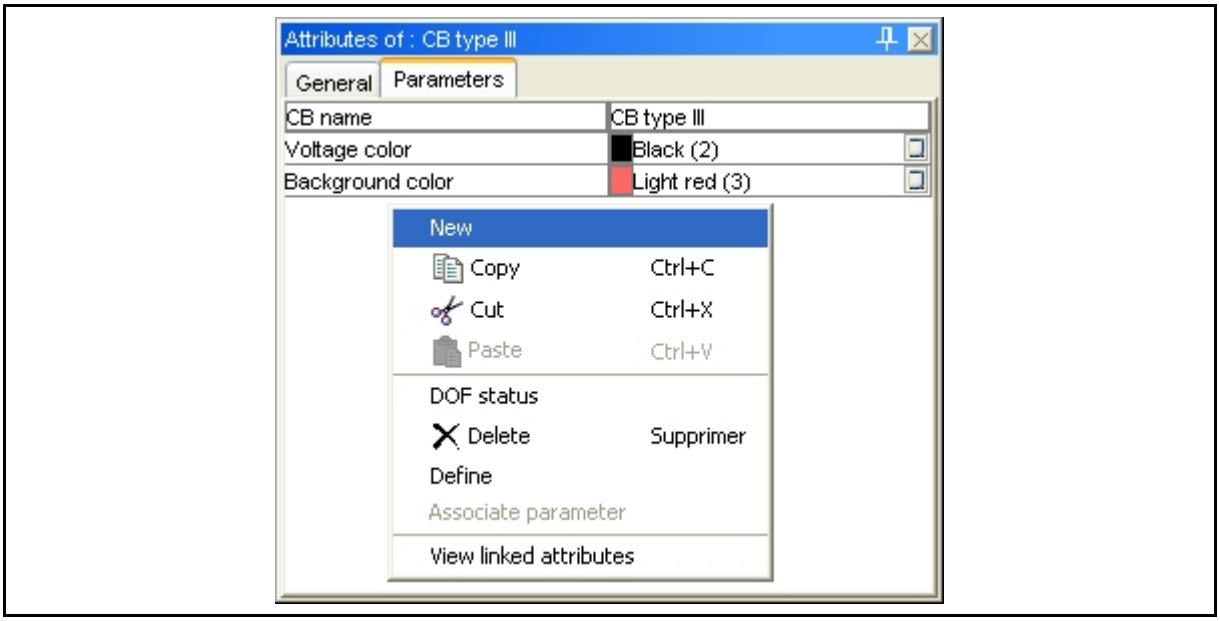



FIGURE 98 - EDIT/NEW PARAMETER

2. A **new parameter is created** with no linked attribute. The name of its parameter can be changed with a double click on its first column.

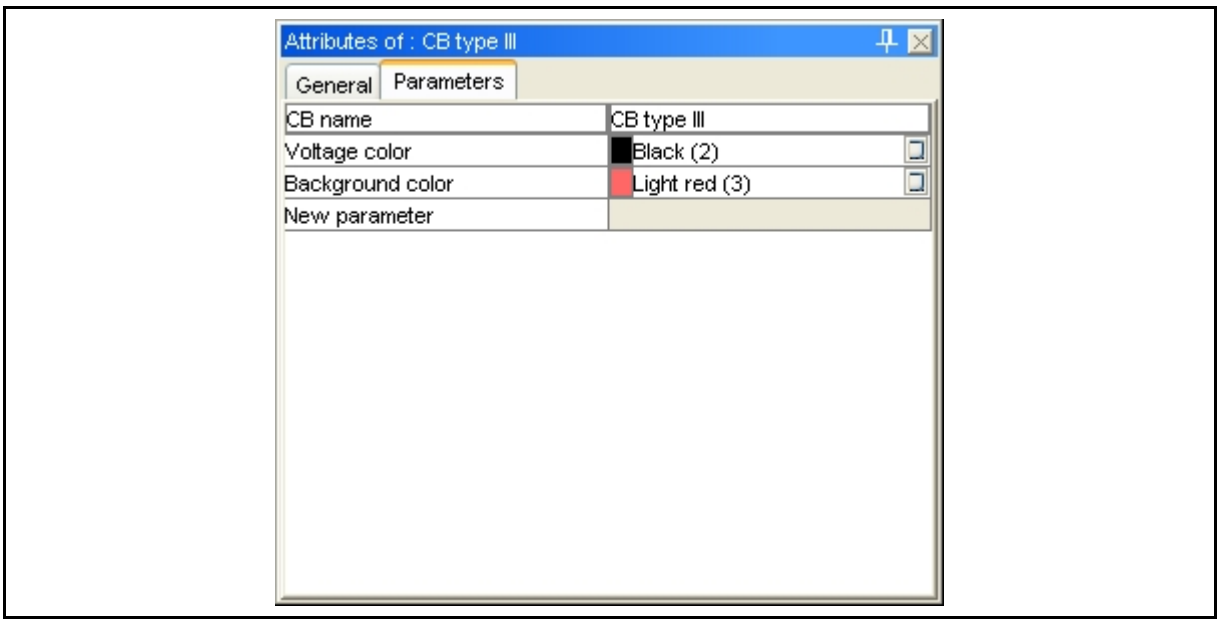



FIGURE 99 - AN EMPTY PARAMETER

### 4.2.22 Define

Purpose 1: define a comment available on ToolTip for a template

Purpose 2: define a comment available on ToolTip for a parameter

Availability:

- Depending on the selected element

Call:

- Contextual menu (Mouse right click) in Attributes Editor (Parameter tab), Templates List

Operation 1:

1. Only in **template mode**, in Templates list area, select a template and choose define item:

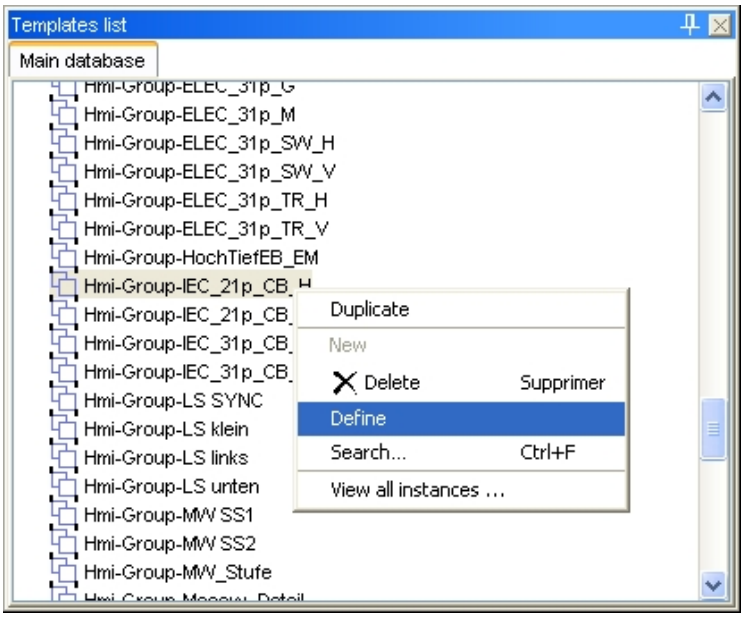



FIGURE 100 - EDIT/DEFINE TEMPLATE

2. A text field editor appears. Type template comment. HTML tags can be used.

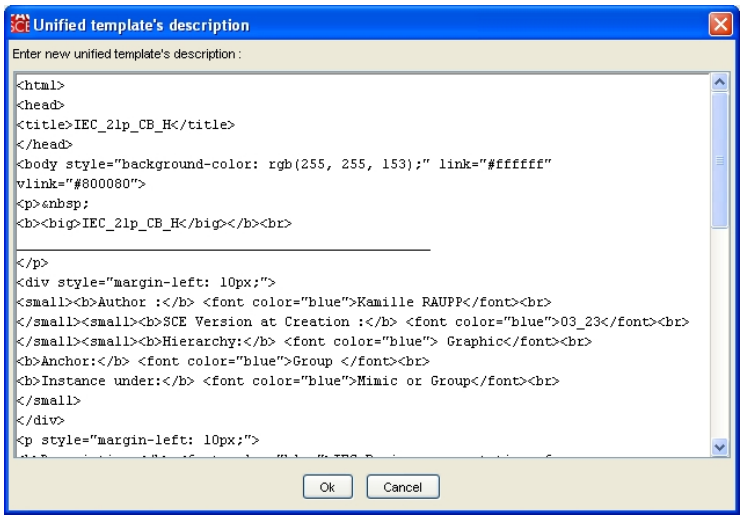



FIGURE 101 - TEMPLATE DEFINITION EDITOR

3. This comment will be displayed as ToolTip in Templates list area.

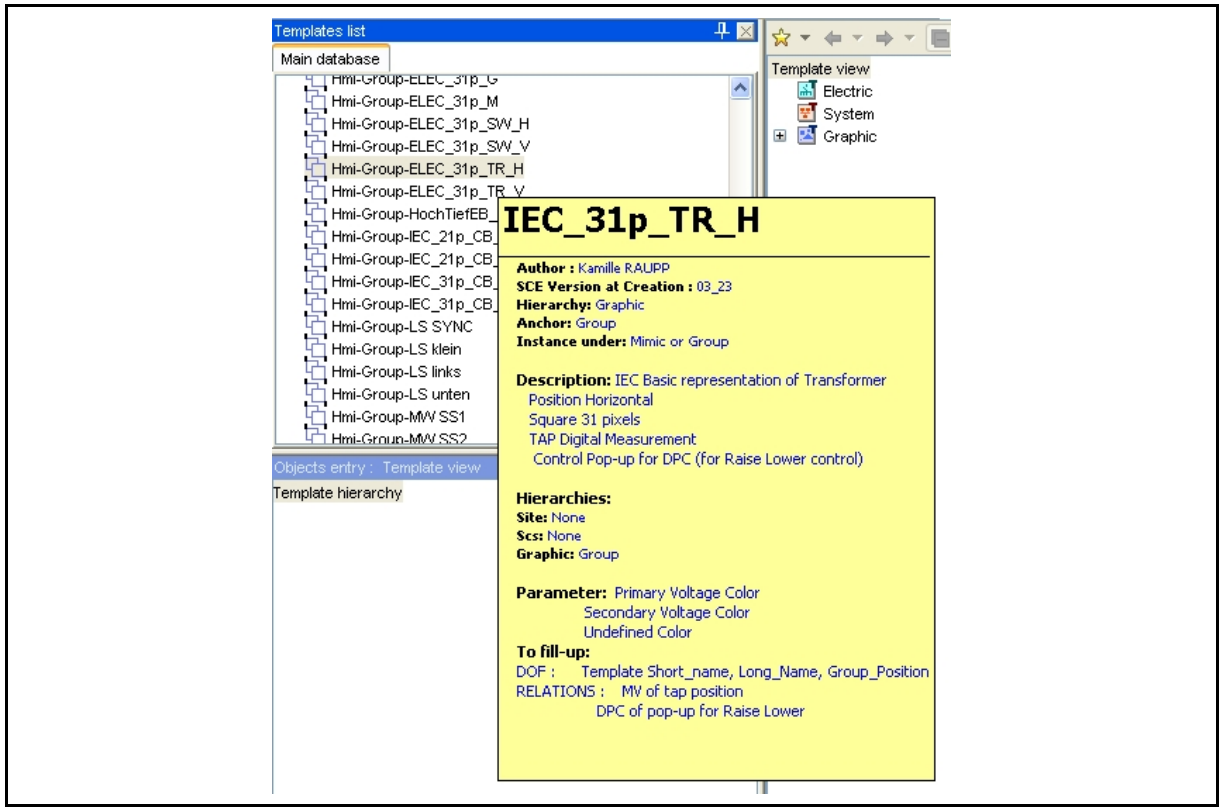



FIGURE 102 - TEMPLATE DEFINITION TOOLTIP

Operation 2:

1. Only in template mode:
   - select a template in Templates list,
   - then select the **anchor** of a template in Navigator,
   - then select the **parameter tab** in Attribute editor. Choose Define item:

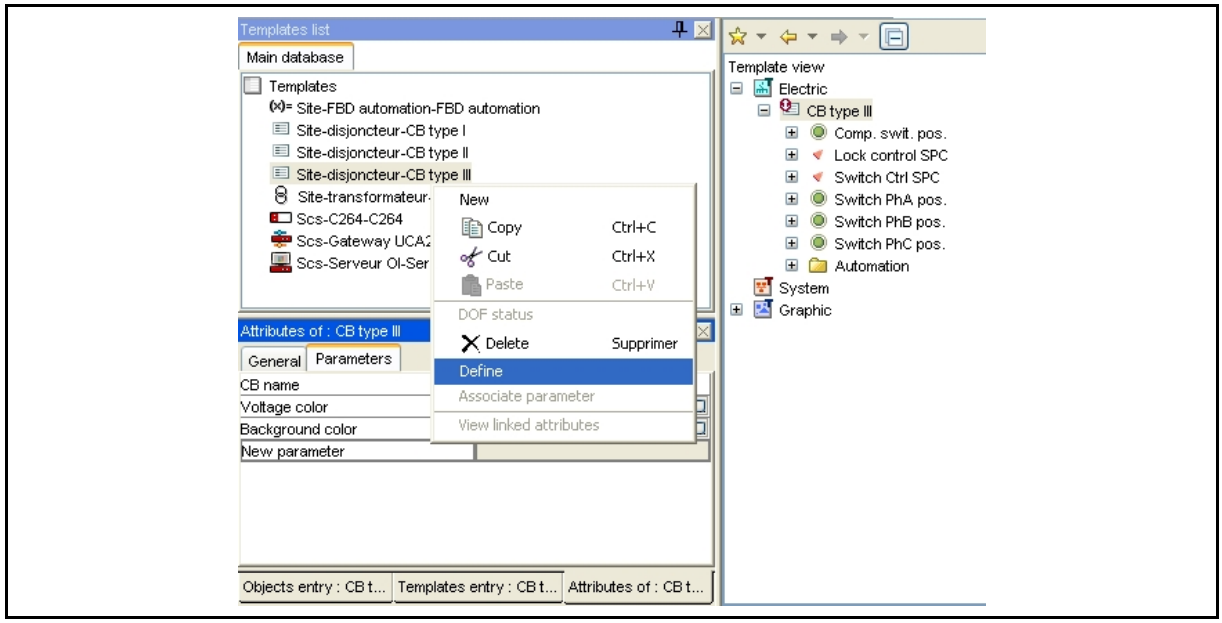



FIGURE 103 - EDIT/NEW PARAMETER

2. A text field editor appears. Type parameter comment. The HTML tags can be used.

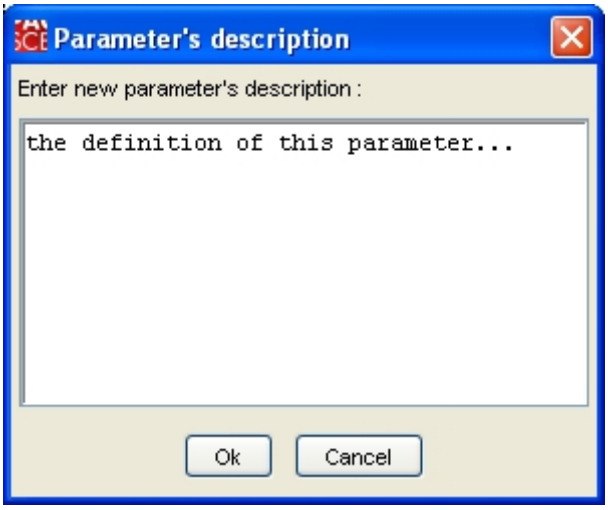



FIGURE 104 - PARAMETER DEFINITION EDITOR

3. This comment will be displayed as ToolTip in Attributes editor, tab parameter:

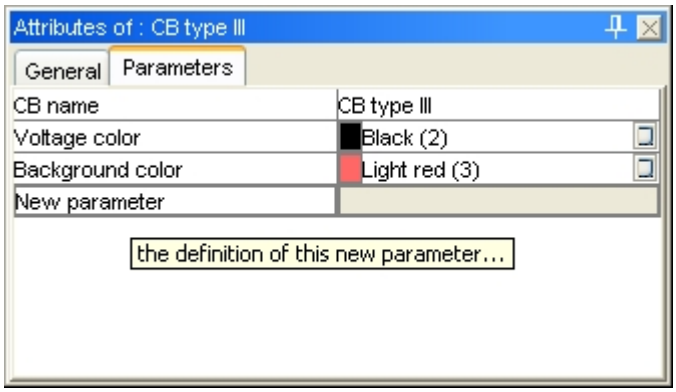



FIGURE 105 - PARAMETER DEFINITION TOOLTIP

### 4.2.23 Associate Parameter

Purpose:

- Associate the selected attribute as a new parameter or as an existing parameter.

**A parameter is a link between several attributes**. When an element of this set is modified, the other are also modified. This shortcut allows to modify only one attribute instead of modifying n times with same value n attributes.

Availability:

- Depending on the selected element

Call:

- Contextual menu (Mouse right click) in Attributes Editor

Operations:

1. Select an **attribute** in Attribute editor, in **template Mode only**
2. Choose Associate item parameter. This item is enabled **if a parameter is available** for the selected attribute:
   - an **empty parameter** with no linked attribute,
   - or a parameter already linked to another **compatible attribute**.

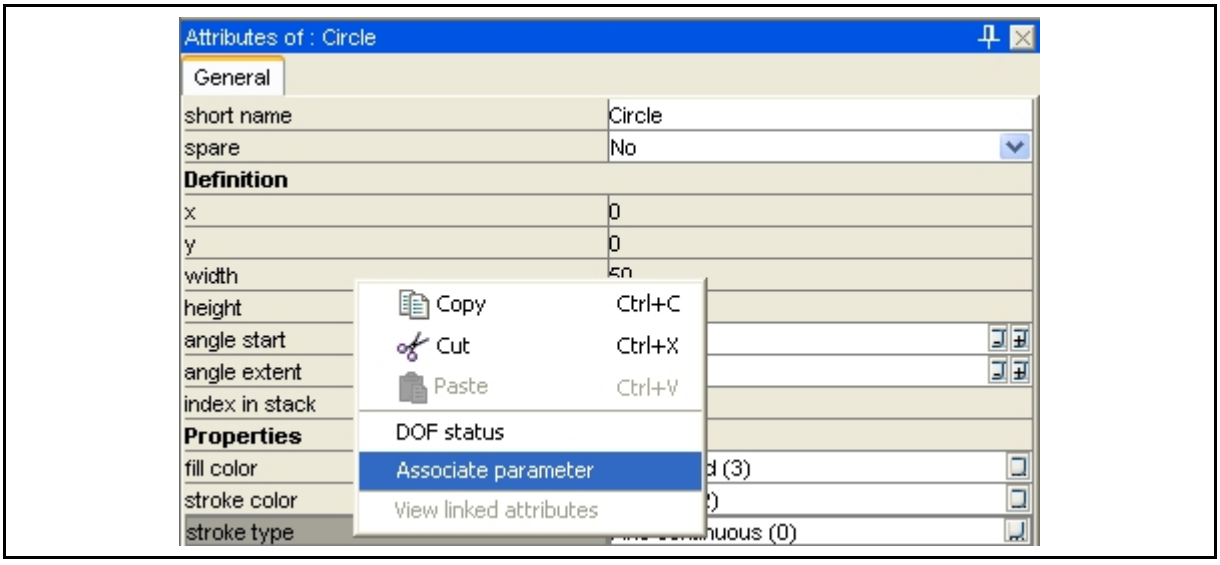



FIGURE 106 - EDIT/ASSOCIATE PARAMETER ITEM

3. The following dialog box appears. It propose available parameters which can be linked to the selected attribute.

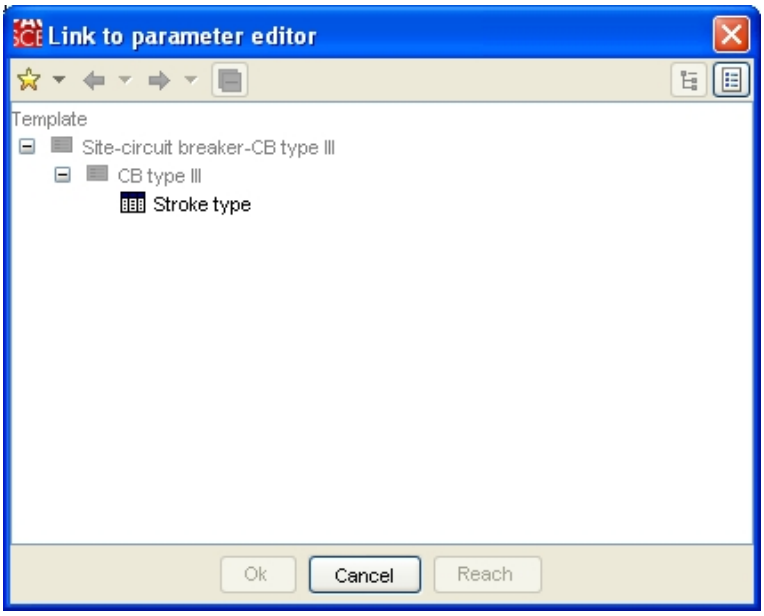



FIGURE 107 - LINK TO PARAMETER EDITOR

4. After selection of a parameter, click the **Ok** button. The selected parameter is now **linked to the chosen parameter**: any modification of one among them is propagated on the other(s). This indication appears in the **status bar** when the attribute is selected. See also **EDIT/View linked attributes** to visualise the set of linked parameter and attributes.

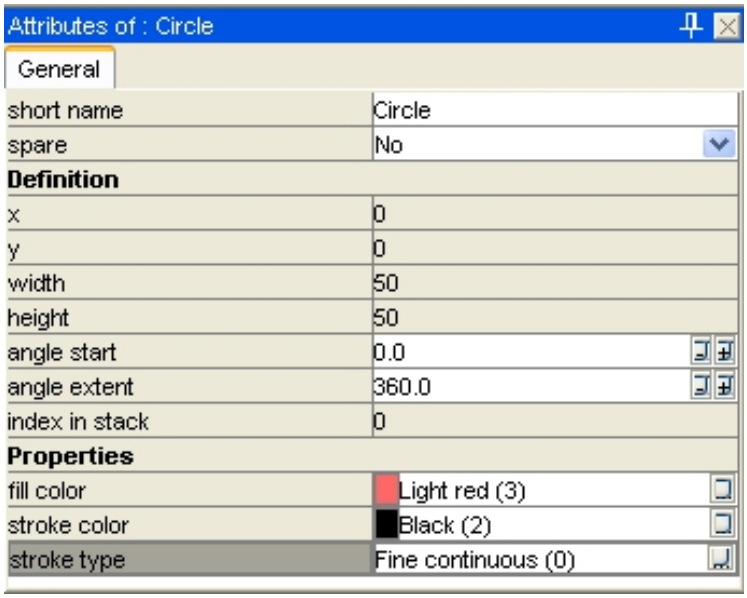



FIGURE 108 - LINKED PARAMETER

### 4.2.24 DOF Status

Purpose:

- Toggle the selected attribute or parameter as a **Degree Of Freedom** (DOF).
- In that case, in object mode, for the template instance, the target object attribute/parameter value can be modified even if the object is linked to its template. The font colour of an attribute DOF label is blue in the template and black in the target object.

Availability:

- Depending on the selected element
- Template mode only

Call:

- Contextual menu (Mouse right click) in Attributes Editor

Operations:

1. Select **an attribute or a parameter** in Attribute editor, in **template mode only**. If the attribute is linked to a parameter, the item is not enabled: item is enabled only for the linked parameter.

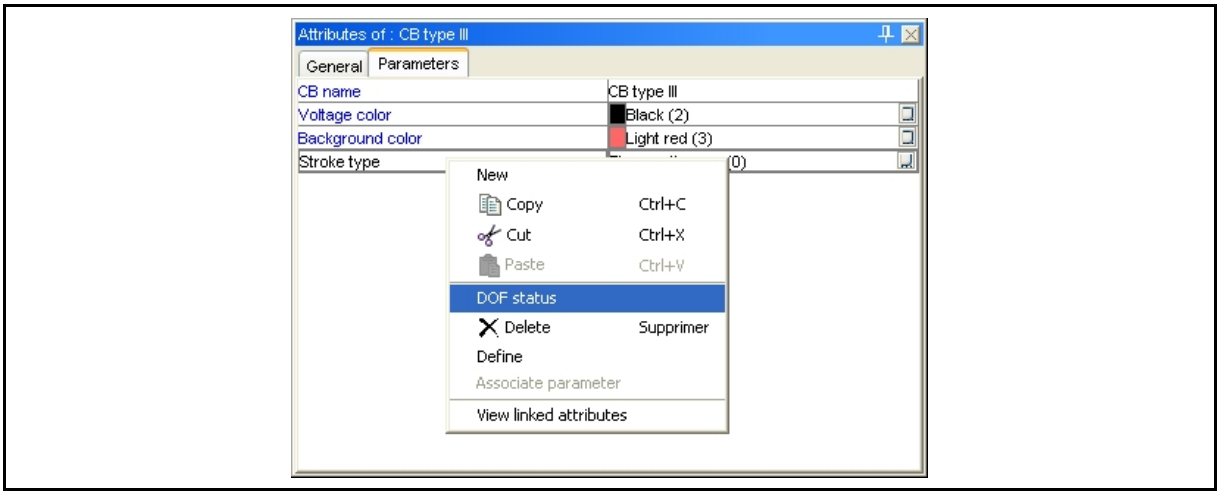



FIGURE 109 - EDIT/DOF STATUS ITEM

2. Choose DOF Status item. The DOF status of the attribute/parameter is inverted:

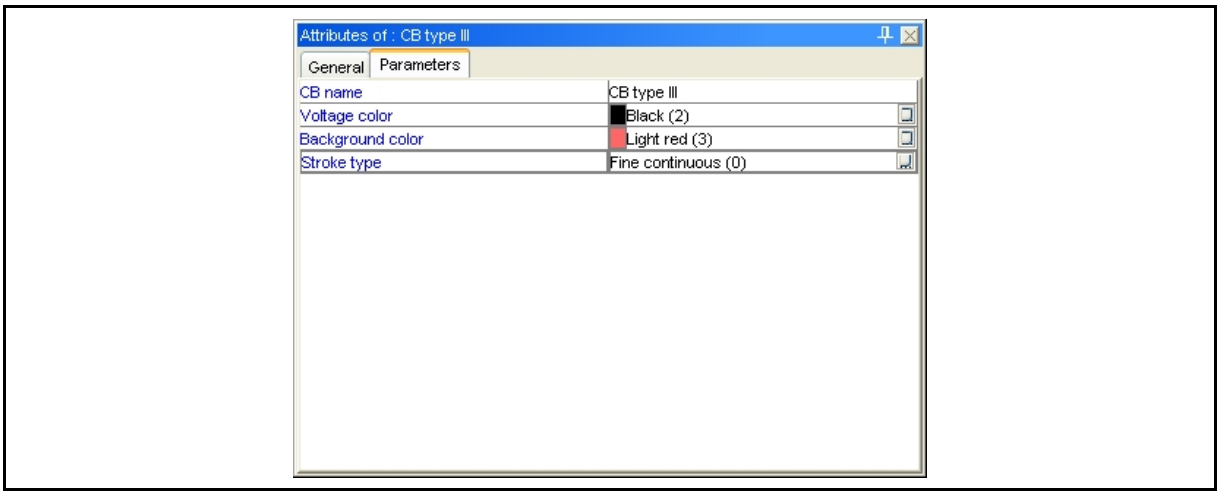



FIGURE 110 - TOGGLE DOF STATUS

3. In object mode, the DOF attribute/parameter becomes updateable:

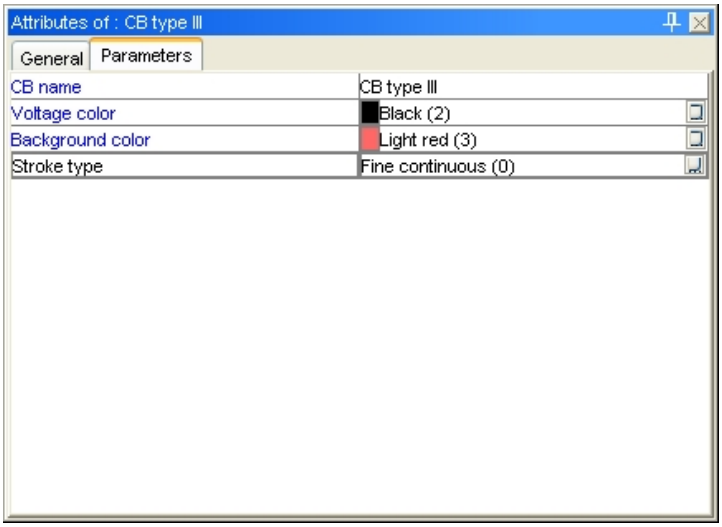



FIGURE 111 - OBJECT MODE AND DOF STATUS

### 4.2.25 SBus Automatic Addressing

Purpose:

- Create automatically the SBus mapping of SBus PACiS device.
- The creation rules and its limitations are described in chapter AP.

Availability:

- The procedure is available in the contextual menu of PACiS SBus devices or Ethernet, only for Object mode.

Call:

- Contextual menu (Mouse right click) in Navigator, Components List

Operation:

1. Select a PACiS SBus device (OI, C264, GTW) in navigator.
2. Select contextual menu item SBus Automatic Addressing.

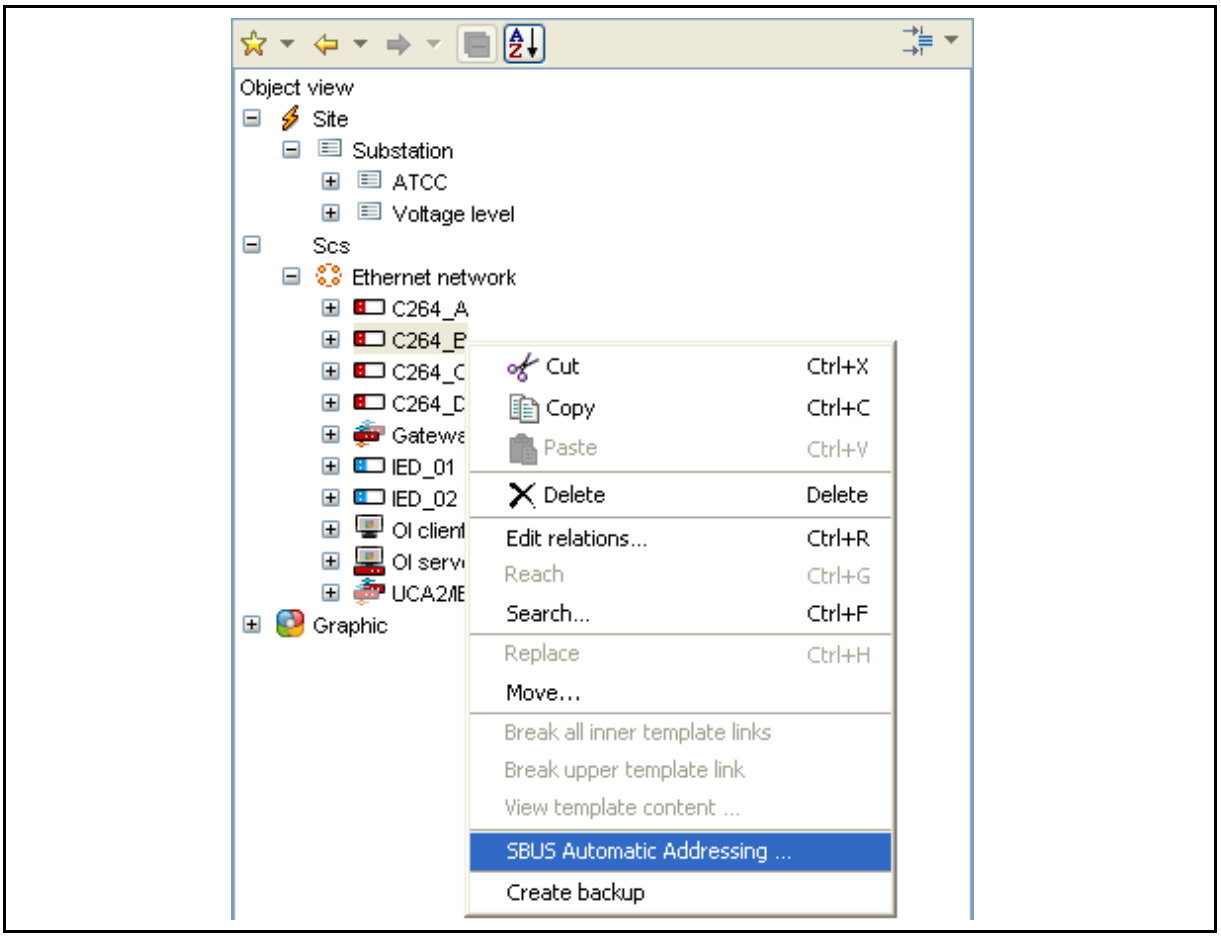



FIGURE 112 - EDIT/SBUS AUTOMATIC ADDRESSING FOR SBUS DEVICE

3. The SBus mapping of the selected device is created following the PACiS IEC 61850 projection rules.

or

4. Select Ethernet object in navigator
5. Select contextual menu item SBus Automatic Addressing.

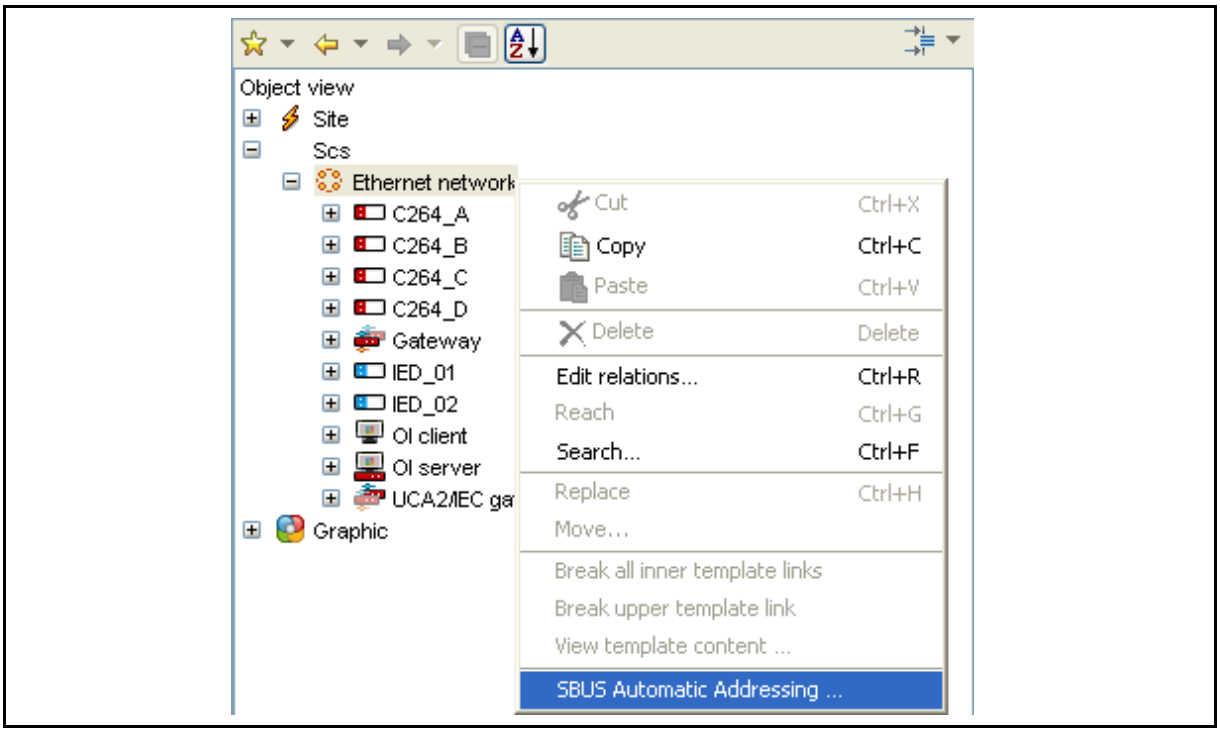



FIGURE 113 - EDIT/SBUS AUTOMATIC ADDRESSING FOR ETHERNET OBJECT

6. The SBus mapping of ALL PACiS SBus devices (OI, C264, GTW) are created following the PACiS IEC 61850 projection rules.

### 4.2.26 Unused templates

Purpose:

- In Templates list area, hide/show templates that are unused at objects level or upper template level.

Availability:

- Template is selected in Templates list area.

Call:

- Contextual menu (Mouse right click) in templates list area

Operation:

1. Select a template in Templates list area.
2. Choose **Unused templates** item. If this item was not previously ticked it is "ticked": the Templates list contains used and unused templates. If this item was previously ticked it is "unticked": the Templates list contains only the used templates.

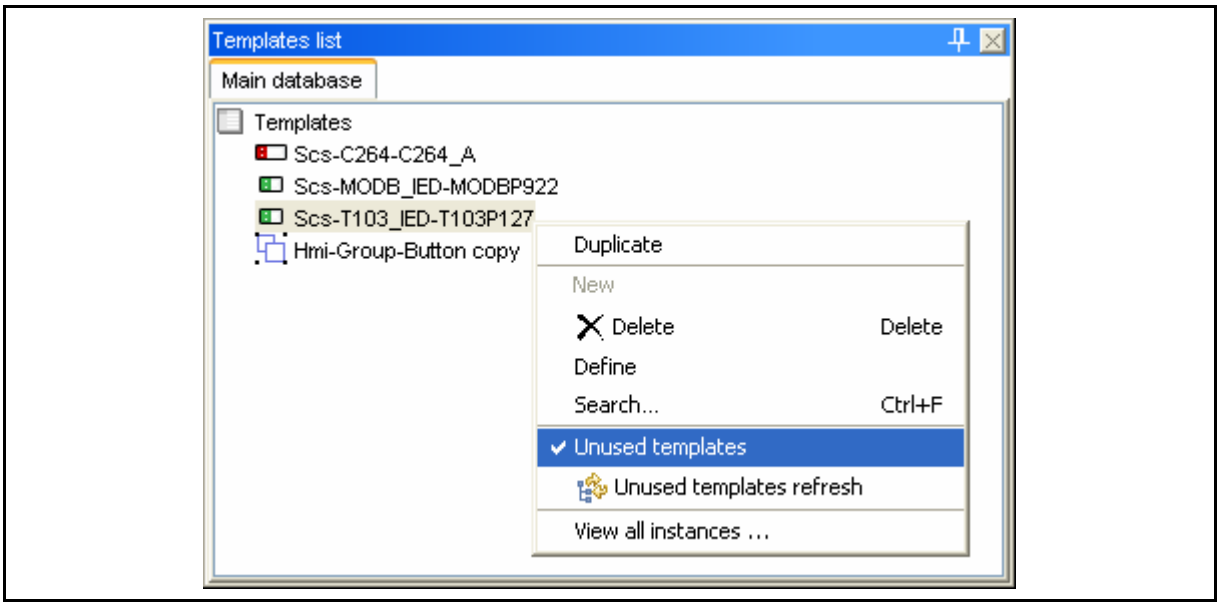



FIGURE 114: UNUSED TEMPLATES CONTEXTUAL MENU

4.2.27 Unused templates refresh

Purpose:

- Refresh the Templates list area according to the state ( ticked or unticked) of the Unused templates item.

Availability:

- Template is selected in Templates list area.

Call:

- Contextual menu (Mouse right click) in templates list area

Operation:

1. Select a template in Templates list area.
2. Choose **Unused templates refresh** item.

## 4.3 User Menu

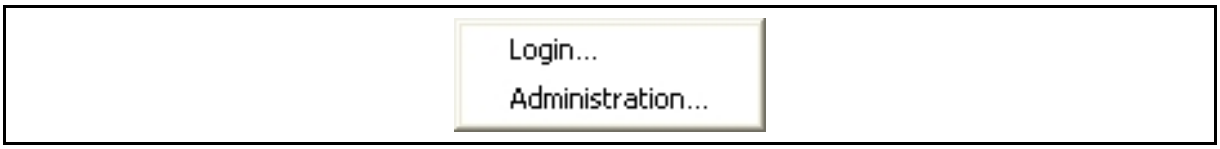



FIGURE 115 - USER MENU

### 4.3.1 User/Login

Purpose:

- Allows a user to log in the PACiS SCE application giving a user name and the password. The user has profile of available actions with PACiS SCE that filter information relatively to the profile. At session beginning, there is a default right defined by product options and licences.

Availability:

- Always

FIGURE 116 - USER/LOGIN POP-UP

Operation:

This window is modal.

- **User name**: a text field to enter the login name. If it is not the first time that the PACiS SCE is launched, the login name of the previous user is already entered.
- **Password**: when the user enters his password, only stars are displayed in order to hide the password actually entered.
- **Profile**: the profile that the user wants to use in the current session. The last used profile, is proposed by default. Only the profile available for the user set in the Username field are selectable in the combo box.
- **Cancel** button: the dialog box is closed without processing any login.
- **Ok** button: this button is enabled only if the information provided in the editable fields are correct., otherwise the button is greyed and it is impossible to click it.

### 4.3.2 User/Administration

Purpose:

- Manages the authorised users on PACiS SCE. The management includes adding or removing a user, changing passwords or profile, modify users relative description.
- Let point that the administrator user cannot remove him.

Availability:

- Only user with the administration profile.

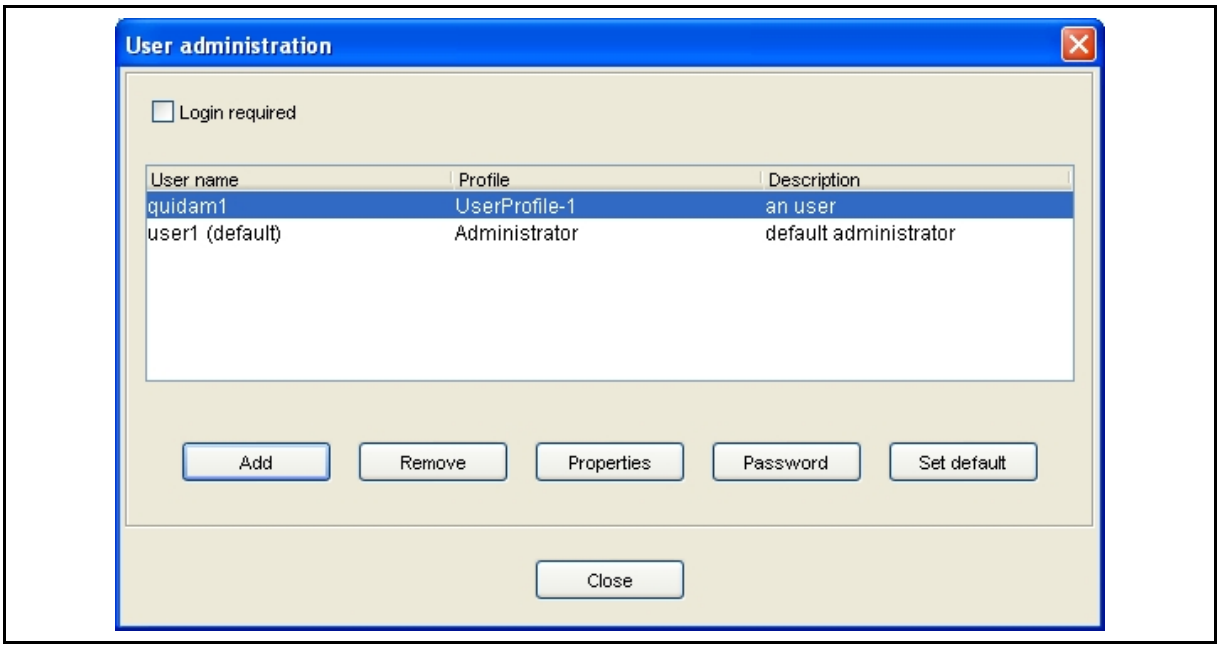



FIGURE 117 - USER/ADMINISTRATION POP-UP

Add defines new user with its profile and description. Remove acts on user selected in reverse video. “Properties” button is a separate definition of profiles, as “Set Default” used when no Login is required. Password is a facility display below to re-enter forgotten password.

Operations:

This window is modal. It displays the user list and allows to make some updates on it.

- Checkbox **Login required**:
  - if selected: the **login is set as mandatory**. The users must use a user name and a password to enter in PACiS SCE.
  - if not selected: the login is set as optional; the passwords can be “empty” strings. the users can **enter in the PACiS SCE without login**. In this case, a default profile (administrator) is given for this session.
- **User table**: display the list of the registered users with their profile and a description field. It is possible to select a user (the line is highlighted).
- **Add** Button: leads to the “user properties” dialog box and allows to add a new user.

FIGURE 118 - USER PROPERTIES POP-UP

- **Remove** button: remove the selected user.
  This button is disabled if:
  - no user is selected,
  - the selected user is the logged one,
  - the logged user does not hold administration rights.
- **Properties** button: leads to the “user properties” dialog and allows to modify the current properties of the currently selected user.
  This button is disabled if no user is selected.
  If the selected user is the only one which has the “administration” profile, it will be impossible to change the profile.
- **Password** button: leads to the “change password” dialog box and allows to change the password of the selected user. This button is disabled if no user is selected.

FIGURE 119 - USER/ADMINISTRATION REDEFINING PASSWORD

- **Set Default** button: set the selected user as the default user.
- **Close** button: close this dialog window.

## 4.4 Graphic Menu

Graphic menu is the collection of items which implements PACiS SCE graphic features:

- **Graphic editors** which are specialised for each kind of target equipment: OI mimic and Computer mimic. The data model and the edition constraints of each of them are different.
- **Graphic palettes**: colour, font, stroke, and bitmap. Theses palettes are used to define the graphical attributes of each graphic object of mimics.

Items are activated when a graphic object is selected in navigator.

The graphic menus are classified from the kind of graphic objects. A graphic object could be a part of an OI mimic or a Computer mimic. Two different graphic editors can be edited them: **OI mimic** editor and **Computer mimic** editor.

**General menu items** (Grid, Zoom, and Anti-aliasing) are independent of this classification. Theses items can be applied to an OI mimic or to a Computer mimic.

**Graphic palettes** can be modified at any moment.

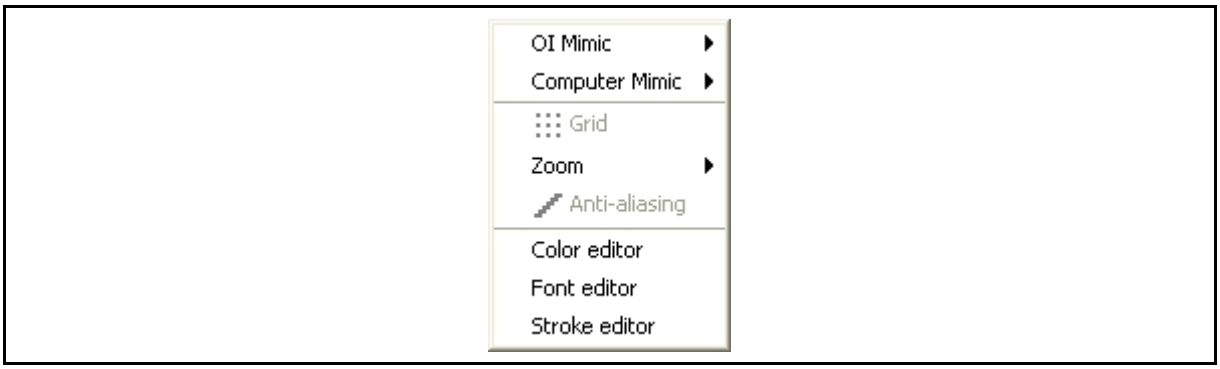



FIGURE 120 - GRAPHIC/MENU

List of items:

| | | |
|---|---|---|
| | OI Mimic | All specialised menu items for OI mimic graphical objects |
| | Computer Mimic | All specialised menu items for Computer mimic graphical objects |
| | Grid | Toggle to activate Magnetic Grid |
| | Zoom | Zoom factors used for the current editor (OI mimic editor or Computer mimic editor). |
| | Anti-aliasing | |
| | Colour editor | The editor of colour palette |
| | Font editor | The editor of font palette |
| | Stroke editor | The editor of stroke palette |

### 4.4.1 Graphic palettes

A palette is a collection of predefined graphical attributes. Each element of a palette is **identified by a number**.

When a graphical object is defined, the graphical attributes of this object is precise with using theses palettes.

When an element of a palette is modified, all users of this element, i.e., all graphical objects which use a reference (its number) to this element are impacted by this modification.

For example, colour 21 is used for circles C1, C2, rectangles R1, R2, and R3. When colour 21 is modified in colour palette, C1, C2, R1, R2, R3 are also modified.

**Colour, font, stroke palettes** are based on the same editor with two parts: left part is the list of palette element, right part is the description of the selected element in the list.

**Bitmap palettes** use the navigator and the attribute editor to define it. A **bitmap editor** allows to edit, pixel by pixel, the selected bitmap.

#### 4.4.1.1 Graphic/Color editor

Purpose:

- A colour editor helps to define **colour palette: 256 colours**. The 19 first colours are fixed. Specific colour palette can be set also as template in order to reuse it with several configurations. A number identifies each colour of the palette.

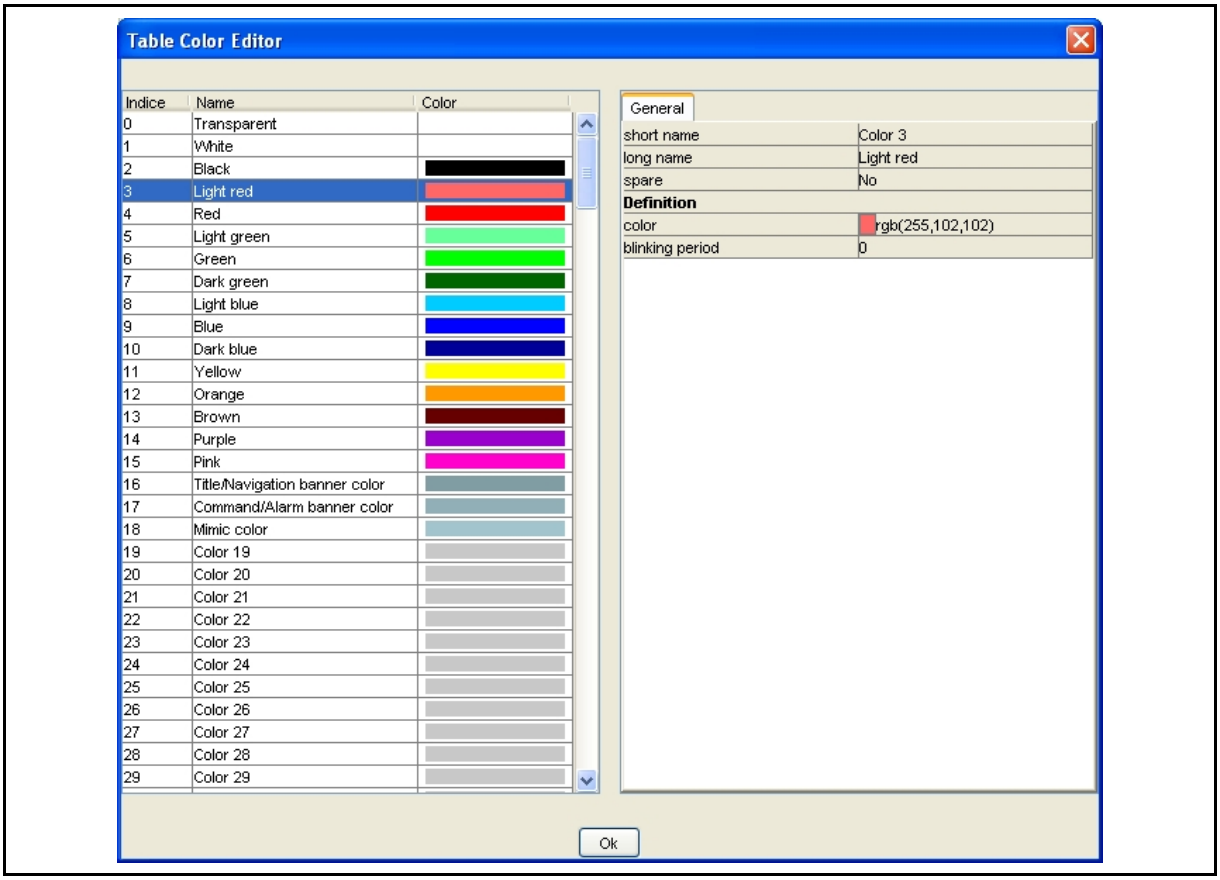



FIGURE 121 - GRAPHIC/COLOR EDITOR

Availability:

- Always

Other call:

- Select a graphical object with a colour attribute and click on button . For example a circle and fill colour attribute. The colour editor allows to edit the palette and also to choose an already defined colour. The index of colour is displayed in the attribute editor between two parentheses.

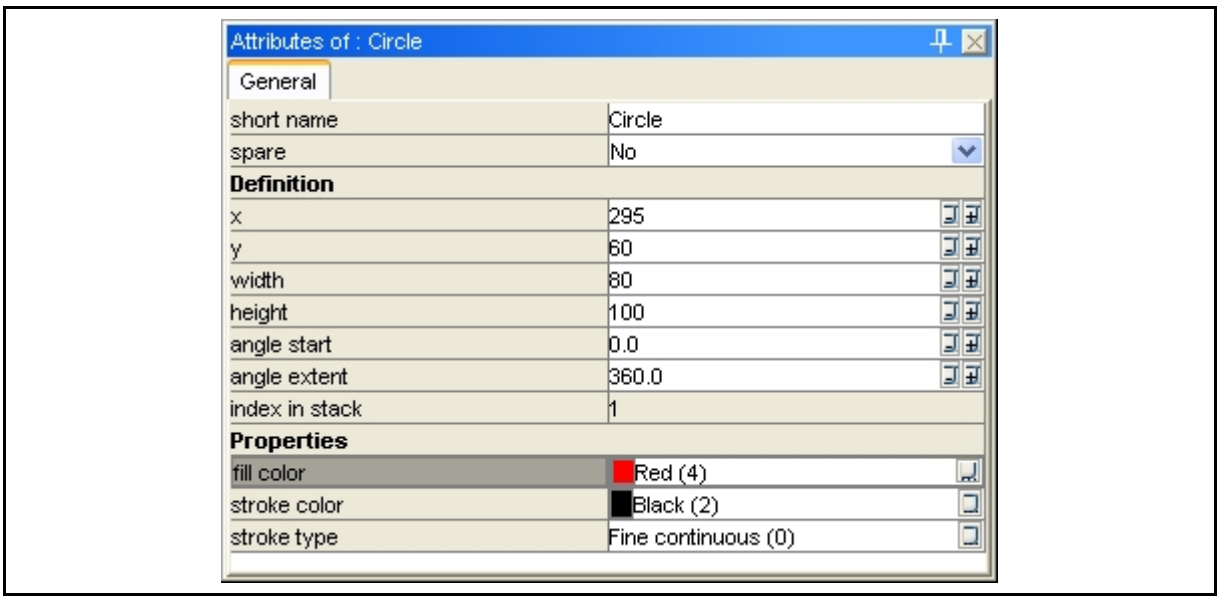



FIGURE 122 - COLOR ATTRIBUTE AND COLOR PALETTE

Operation:

1. Launch color editor from menu graphic
2. Select the color to modify (since 19)
3. Click on Definition/Color or enter directly the new value

Modify the different attributes of the colour at the right part of the table. This part contains the definition of the selected colour at the left part: long name, colour, and blinking period. The graphical representation of the colour is updated at the left part:

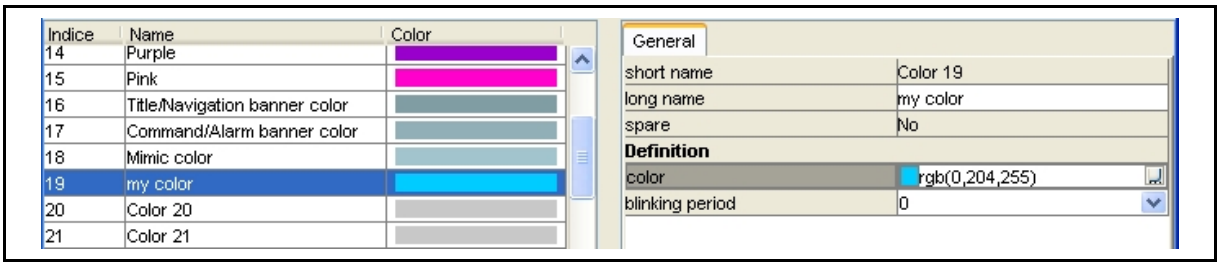



FIGURE 123 - COLOR GENERAL DEFINITION

The pop-up for colour definition propose definition in RVB, HSB format. The samples help to play with front/back policy.

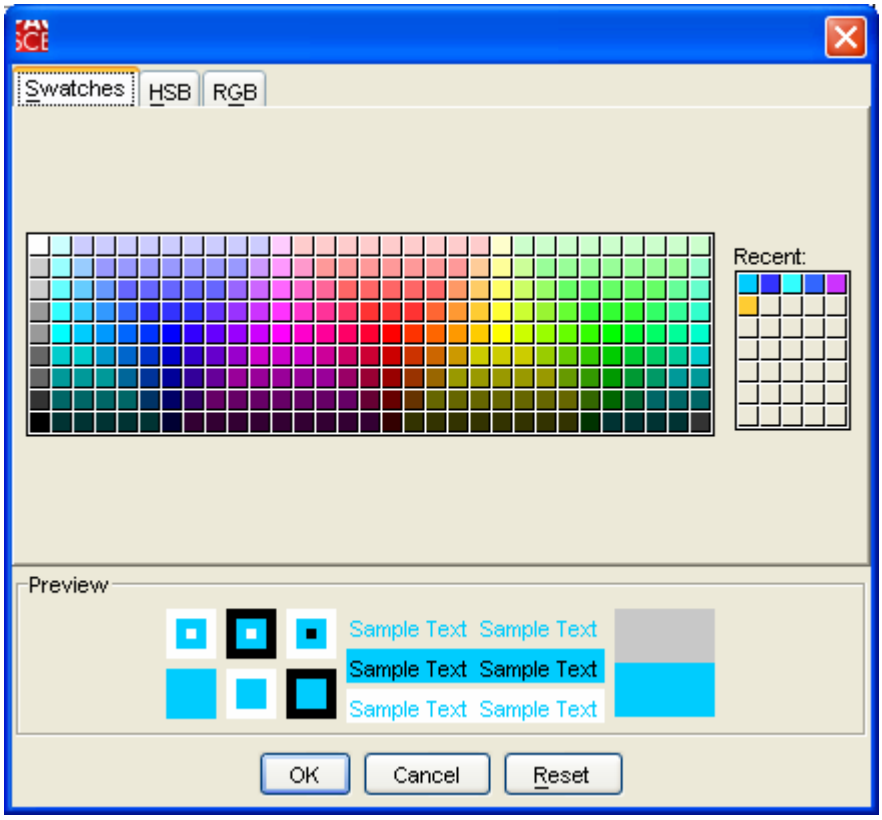



FIGURE 124: COLOR DEFINITION

4.4.1.2 Graphic/Font editor

Purpose:

- A font editor helps to define **font palette: 64 fonts**. The 4 first fonts are predefined and can not be modified. Specific font palette can be set also as template in order to reuse it with several configurations. A number identifies each font of the palette.

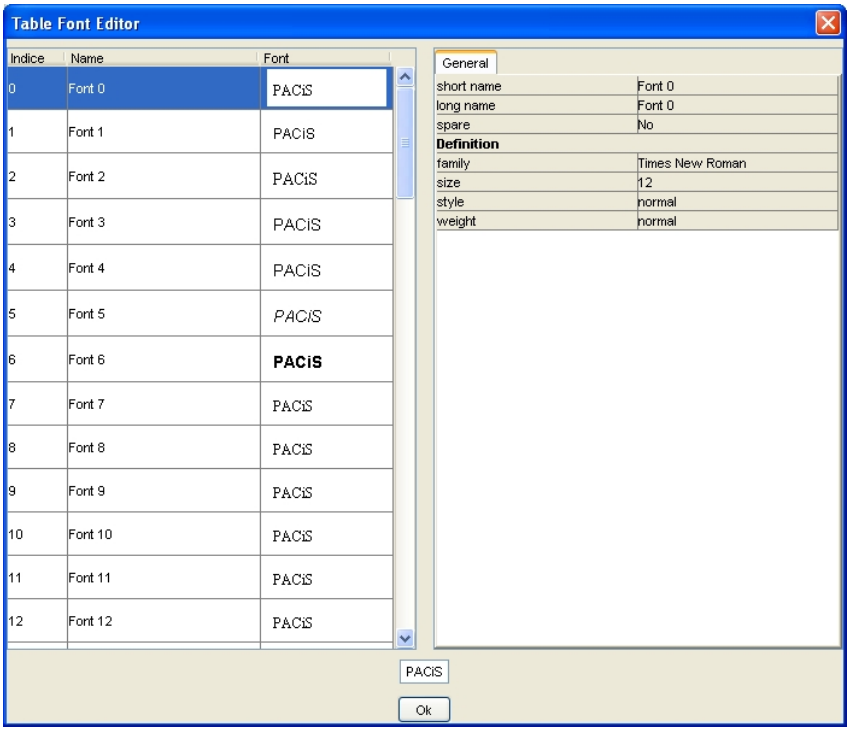



FIGURE 125 - GRAPHIC/FONT EDITOR

Availability:

- Always

Other call:

- Select a graphical object with a font attribute and click on button .
  For example a text and font attribute. The font editor allows to edit the palette and also to choose an already defined font. The index of font is displayed in the attribute editor between two parentheses.

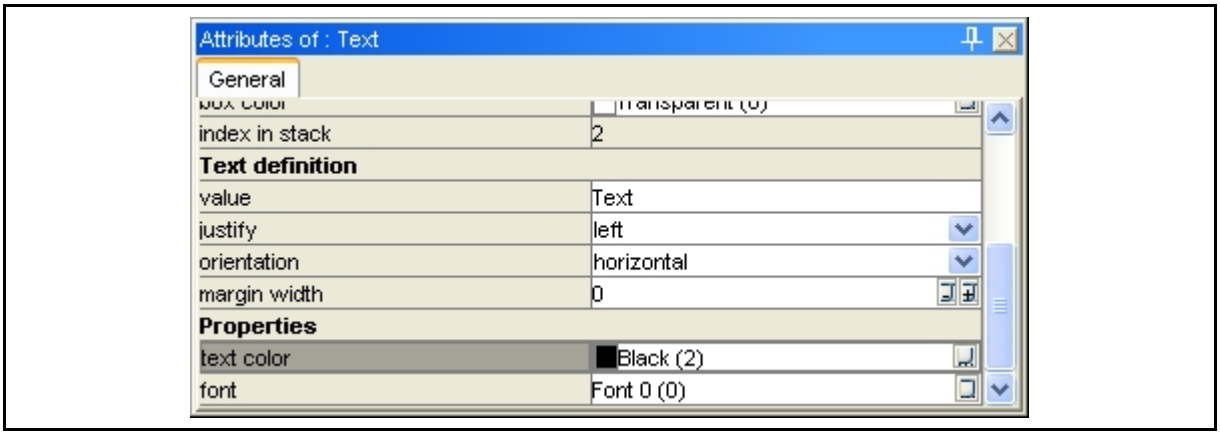



FIGURE 126 - FONT ATTRIBUTE AND FONT PALETTE

Operation:

1. Launch font editor from menu graphic
2. Select the font to modify (since 4)

Modify the different attributes of the font at the right part of the table. This part contains the definition of the selected font at the left part: long name, family, size, style and weight. The graphical representation of the font is updated at the left part:

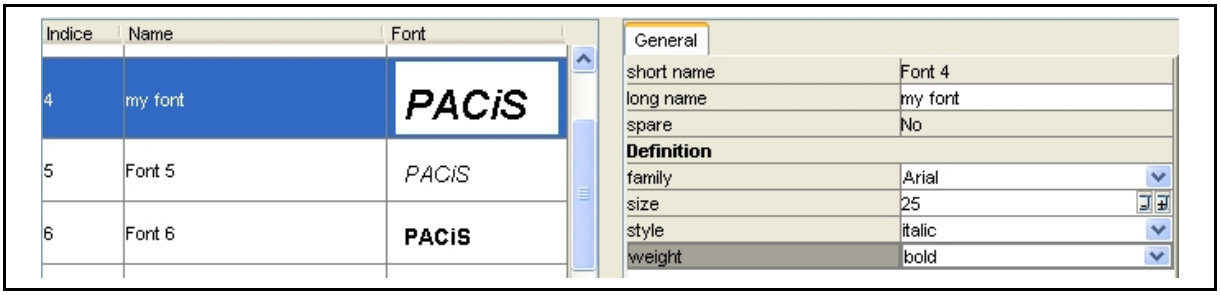



FIGURE 127 - FONT MODIFICATION

3. At any moment, the test text can be modified: edit it with the field at the bottom of the font editor, then the font column is modified with the new value.

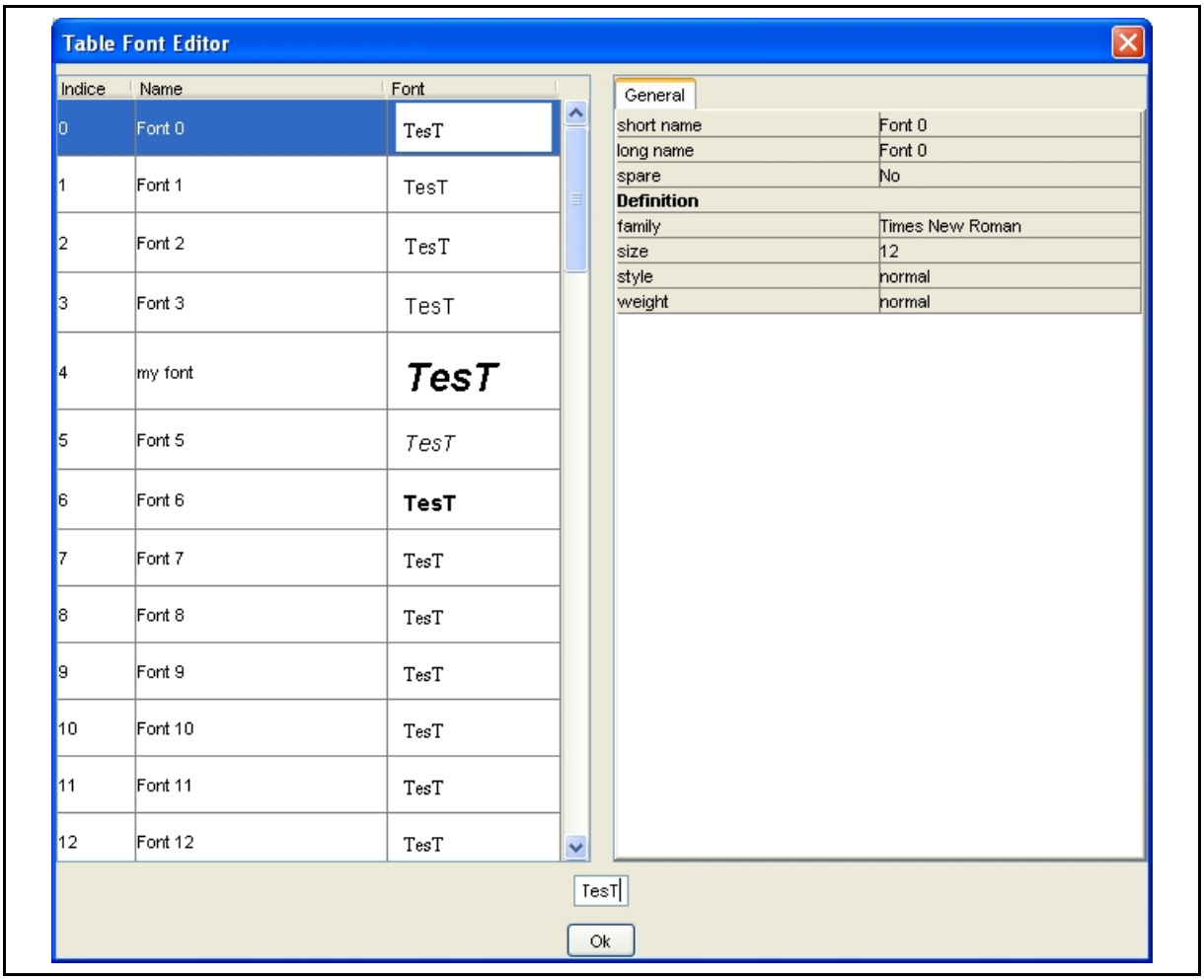



FIGURE 128 - FONT TESTING

4.4.1.3 Graphic/Stroke editor

Purpose:

- A stroke editor helps to define **stroke palette: 64 strokes**. The 5 first strokes are predefined and can not be modified. Specific stroke palette can be set also as template in order to reuse it with several configurations. Each stroke of the palette is identified by a number.

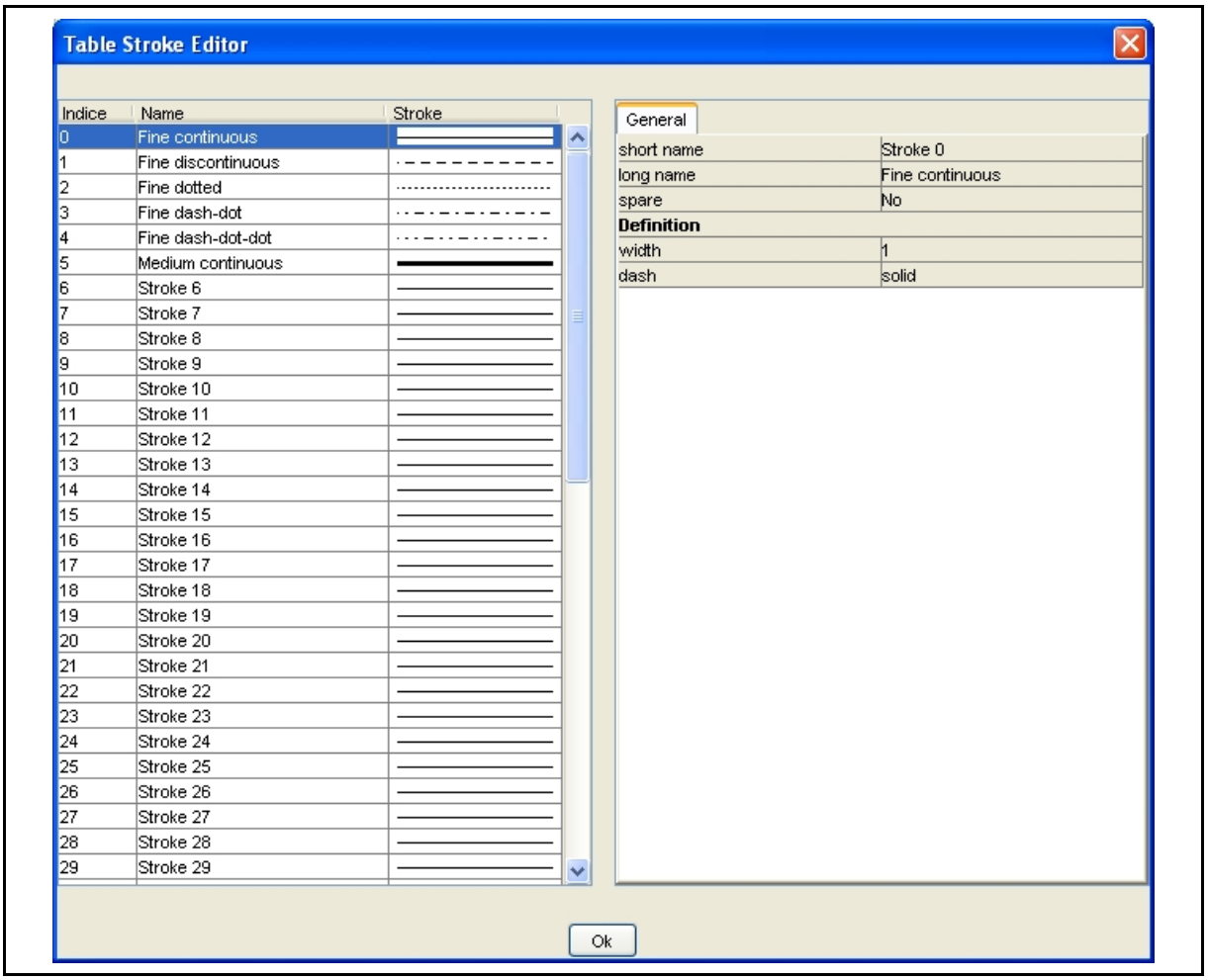



FIGURE 129 - GRAPHIC/STROKE EDITOR

Availability:

- Always

Other call:

- Select a graphical object with a stroke attribute and click on button ....
  For example a circle and its stroke type attribute. The stroke editor allows to edit the palette and also to choose an already defined stroke. The index of stroke is displayed in the attribute editor between two parentheses.

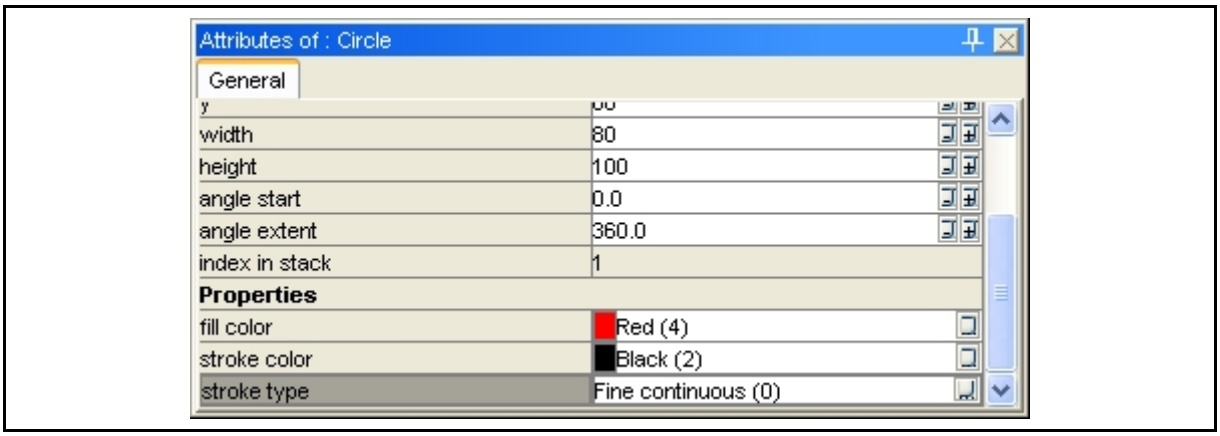



FIGURE 130 - STROKE ATTRIBUTE AND STROKE PALETTE

Operation:

1. Launch stroke editor from menu graphic

2. Select the stroke to modify (since 4)

Modify the different attributes of the stroke at the right part of the table. This part contains the definition of the selected stroke at the left part: long name, width, and dash. The graphical representation of the stroke is updated at the left part:

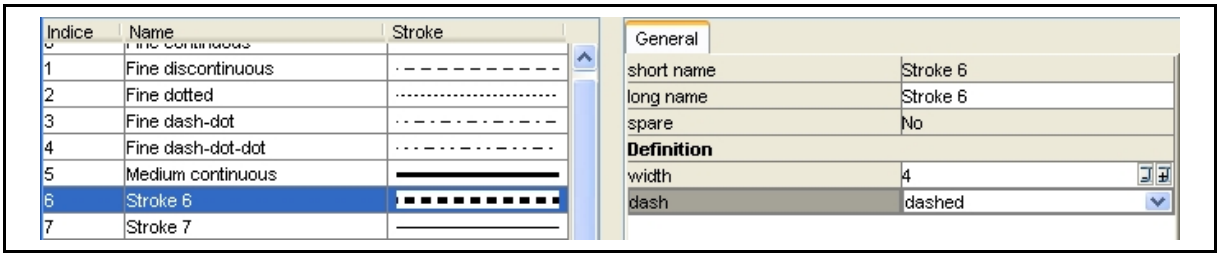



FIGURE 131 - STROKE DEFINITION

4.4.1.4 Bitmap table and bitmap editor

Purpose:

- **The bitmap table** is a bitmap palette. It contains **150 bitmaps maximum**. Each bitmap is identified by a number, its identifier. Bitmap is used during Computer mimic definition, with this unique reference (see Computer mimic section).

  There is no specific editor to edit bitmap table: use navigator and attribute editor to edit it. The data model of this palette is the same than the three other palettes. Bitmap table is an object of Graphical tables of Graphical views. Each bitmap is a component of bitmap table. So for adding a bitmap, use object entry and for deleting one, use edit/delete menu item.

  A **good practise** is to **name the bitmap with identifier as a prefix**.

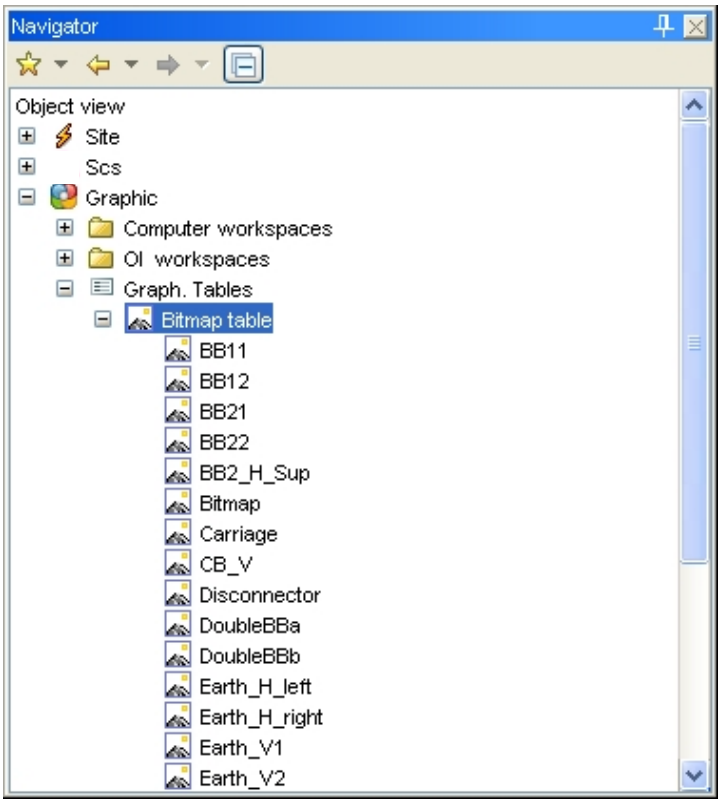



FIGURE 132 - BITMAP PALETTE THROUGH NAVIGATOR

- **A bitmap** is implemented in PACiS SCE by one or several files with *.png format.

  A **bitmap file** is stored into the configuration database (.mpl or .mpc).
  A bitmap file could be imported with another format (.jpg, .jpeg, .gif or .png) but it is always transcribed into .png format.

  A bitmap could be a single bitmap or multiple bitmap.
  **Single bitmap** is displayed in a mimic without any animation, only one file is necessary to define this kind of bitmap.
  **5-uple bitmap** or multi-state bitmap is used to represent an object with different states: a bitmap file by state. A specific multi-state bitmap is defined with 5 pre-defined states: default, open, closed, withdrawn open, withdrawn closed.

  The bitmap file can be edited by an external tools and import it. It can be also edited inside PACiS SCE with a **bitmap editor**.

Availability:

- Always

Operation:

1. Select the bitmap through the navigator. After this selection, a bitmap editor is displayed in graphic area to edit it. It displays the default bitmap file.

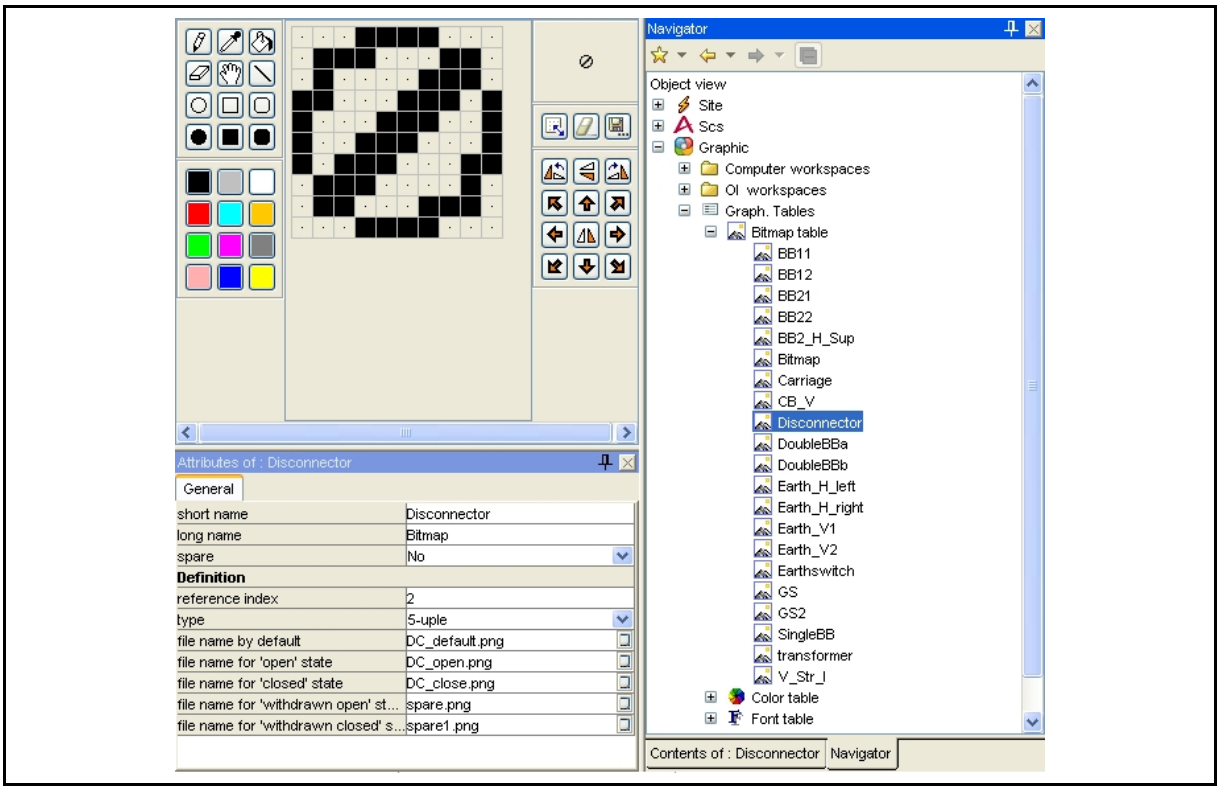



FIGURE 133 - 5-UPLE BITMAP SELECTION

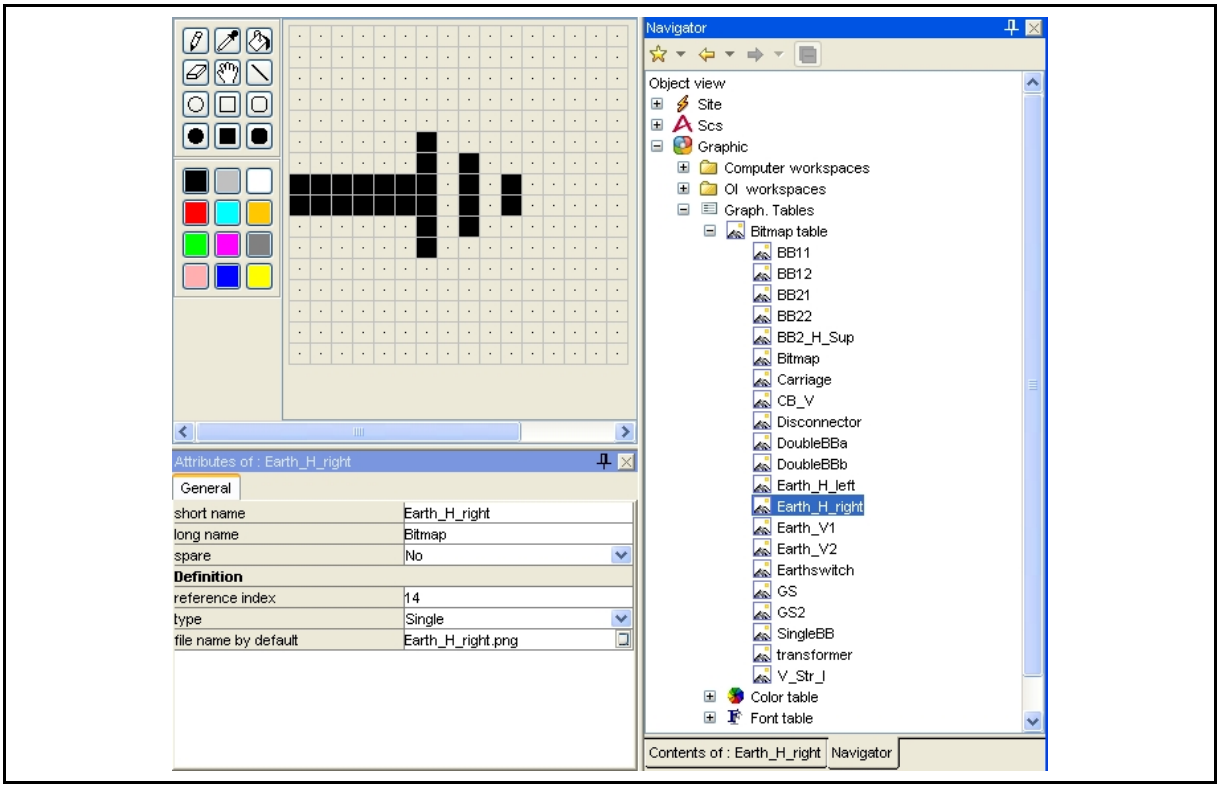



FIGURE 134 - SINGLE BITMAP SELECTION

2. Select the bitmap file to modify from Attribute editor. It is not necessary for Single bitmap because only one file can be edited for this kind of bitmap.

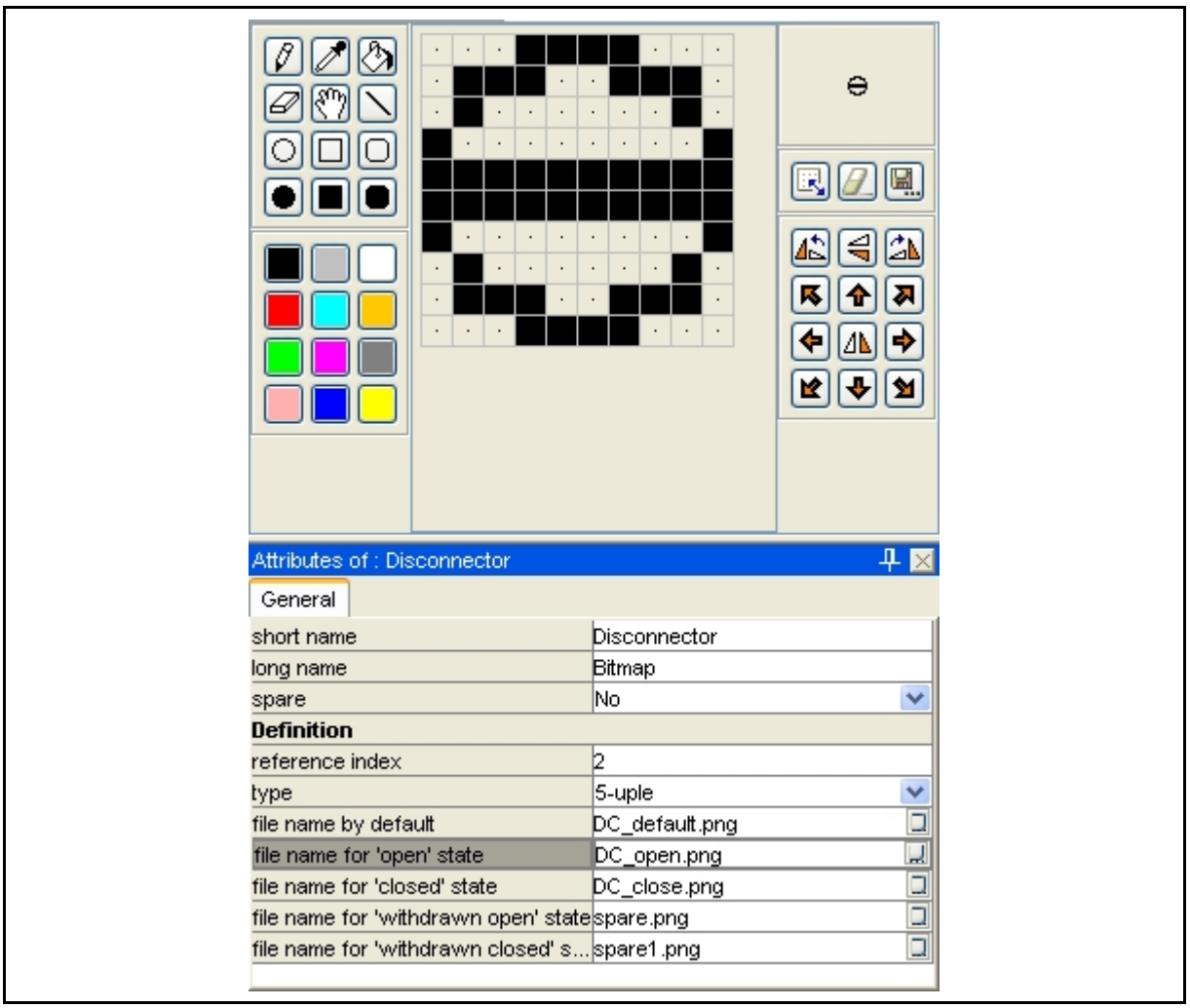



FIGURE 135 - BITMAP FILE SELECTION FOR 5-UPLE BITMAP

1. After its creation, bitmap file name is not filled:

   – You can define it with using of bitmap editor(see below),

   – Or import it through a file chooser: click the button .
   A file chooser appears: the bitmap files library is displayed. This library is local to the current configuration: it is included in .mpc file.
   You can choose among them a file or choose another directory and a bitmap file to import.
   button allows to return to the local bitmap files library.

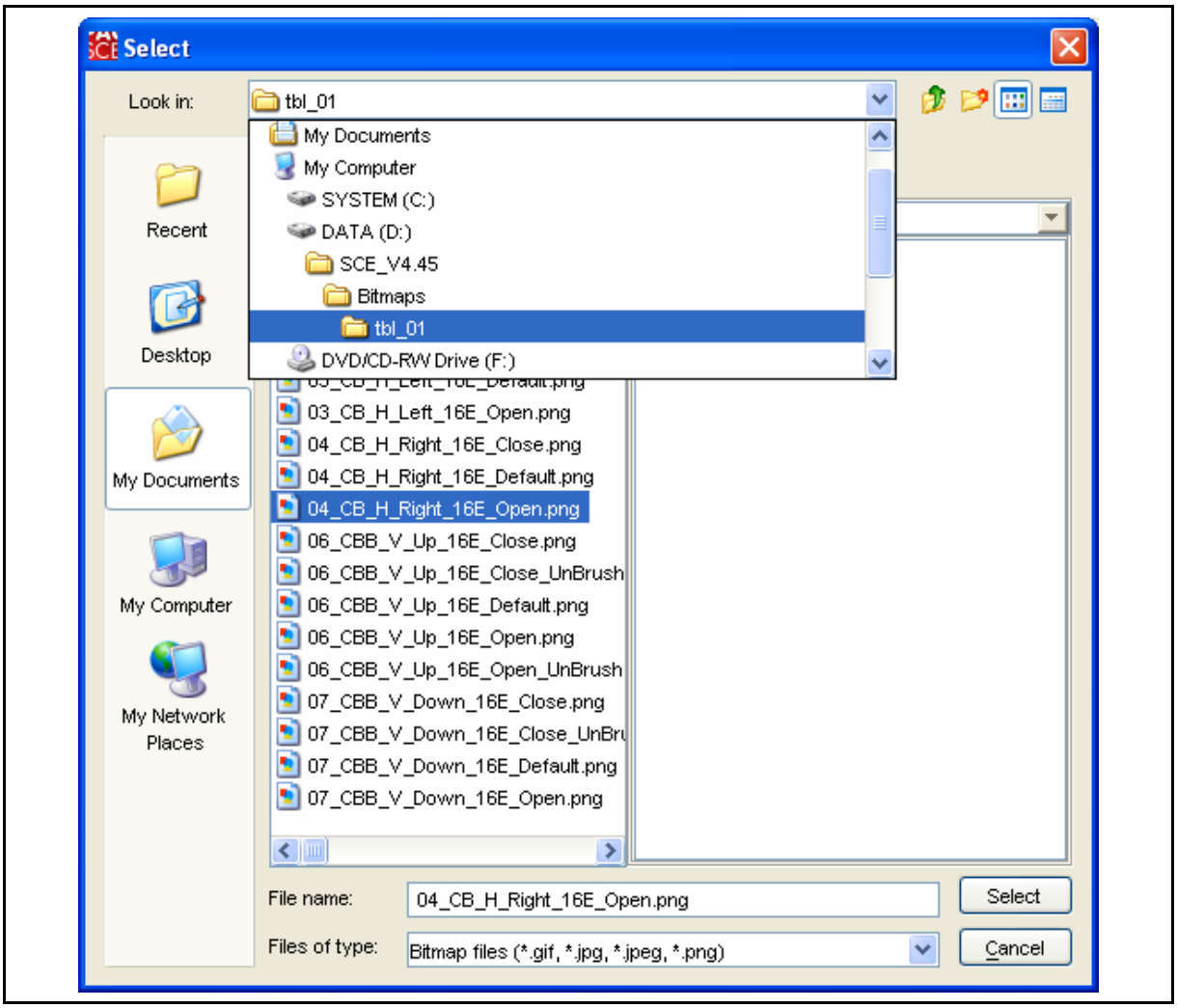



FIGURE 136: BITMAP FILE CHOOSER

2. **Edit** the selected bitmap file **with bitmap editor**. It is a standard pixel editor. It is composed of three parts:

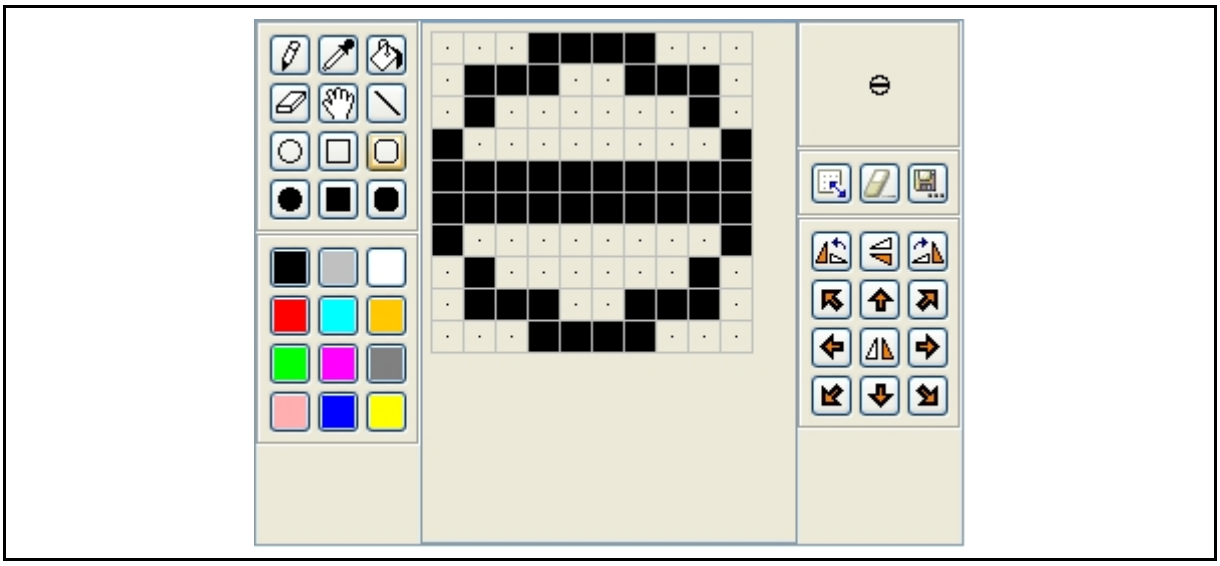


FIGURE 137 - BITMAP EDITOR

- **left part** contents the draws tools (pencil, dropper, paint, eraser, and hand to move), the predefined shapes (line, oval, rectangle, rounded rectangle and full oval, full rectangle, full rounded rectangle) and the specific colour palette.
  **Note**: The edited bitmaps are used in computer bay mimics displayed on MiCOM C264 front panel HMI.. Otherwise, the MiCOM C264 front panel HMI is black & white. So the specific colour palette of bitmap editor is not useful for its actual application.

- **central part** contents the pixel editor or pixel view.

- **right part** contents the bitmap pre-viewer, the general function (resize view, erase view, save as action) and then handling tools to rotate, move or flip the current bitmap.

3. Available operations with bitmap editor:

| Objective | Operations |
|---|---|
| **Modify** the colour of **one or several pixels** at the same time | select one paint tool ( or ) in the tool box on the left,<br>select a colour in the palette on the left.<br>click on the pixel or on a bitmap area to change the colour. |
| **Erase** the pixel colour | select the eraser tool ( ) in the tool box on the left,<br>in the pixel view, press the mouse button, drag the mouse to erase the desired pixels, and release the mouse button. |
| **Draw** a predefined **shape** | select one shape tool ( , , , , , , ) in the tool box on the left,<br>in the pixel view, press the mouse button, drag the mouse until the desired dimension, and release the mouse button. |
| **Move** the bitmap | select the hand tool ( ) in the tool box on the left,<br>in the pixel view, presses the mouse button, drag the mouse until the desired position, and release the mouse button. |
| **Move** the bitmap **pixel by pixel** | click on one arrow ( , , , , , , , ) in the tool box on the right. |
| **Rotate** the bitmap | click on one rotation button ( or ) in the tool box on the right |
| **Flip** the bitmap | click on one flip button ( or ) in the tool box on the right |
| **Resize** the bitmap | click on the resize button ( ) in the main tool box on the right.<br>A dialog box appears and the user can modify the width and/or the height of the bitmap. If the user validates these modifications, then the bitmap is resized. |
| **Erase** the bitmap | click on the erase View button ( ) in the main tool box on the right.<br>a confirmation dialog box appears. If the user validates its choice, then the bitmap is erased but the physical file if it exists, isn't removed from hard disk. |
| **Save** the bitmap | The save of the modified bitmap is run automatically when one among following actions is done:<br>select an other attribute,<br>select an other object,<br>switch the mode,<br>close the configuration database,<br>exit of PACiS SCE.<br>If the attribute of the modified bitmap is without value, then a dialog box appears and asks the file name. The user clicks on OK and the save is done with this name if this name isn't already use, else the name is incremented automatically (For example: open *.png becomes open1.png). |
| **Save** the bitmap with an **other file** name | click on the Save As button ( ) in the main tool box on the right.<br>A dialog box appears and asks the new file name. The user clicks on OK and the save is done with this new name, if it isn't already used, else the name is incremented automatically (For example: open *.png becomes open1.png). A new bitmap file is created. There is no specific constraint on the file name.<br>The user can also click on the Cancel button in order to cancel his action and in this case nothing is done. |

### 4.4.2 OI mimic

As all objects, the OI Mimic graphic objects can be manipulated from the **Navigator** and **Attribute Editor**. Nevertheless, the **OI Mimic Editor** is helpful to create graphic objects, by showing a graphical representation of the objects. The OI Mimic menus items allow to create and modify OI Mimic objects through OI Mimic Editor.

Before a full description of theses items, a brief description of OI mimic editor:

- **View and specific toolbar**

The OI mimic is displayed in the graphical area. A specific toolbar can be displayed with window/OI mimic toolbar item. This toolbar contains some OI mimic item shortcuts.

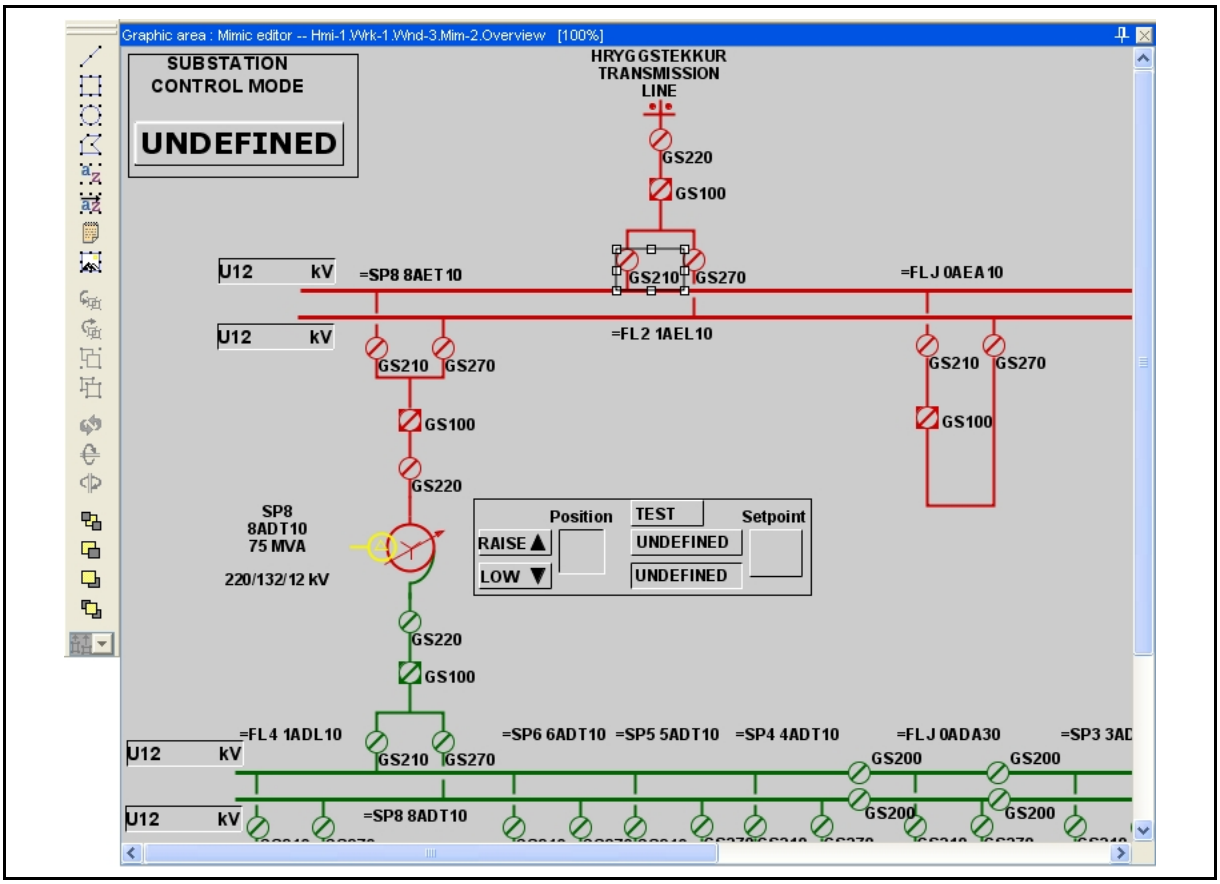



FIGURE 138 - OI MIMIC EDITOR AND ITS TOOLBAR

- **Content**

The content of OI Mimic depends on the selected object in the Navigator.

- If the selected object is a mimic or a component of a mimic, the OI Mimic Editor contains the graphical representation of the mimic.
- otherwise, the graphic area is empty.

The Navigator and the OI Mimic Editor are linked together: any modification done in the OI Mimic Editor is also visible in the Navigator and/or in the Attributes Editor. Reversibly, any modification done in the Navigator or in the Attributes Editor is also visible in the OI Mimic Editor (if the modification has a graphical effect).

- **Selection**

The selected object in the OI Mimic Editor depends on the selected object in the Navigator. More precisely:

- If the selected object is a mimic, no object is selected in the OI Mimic Editor.
- If the selected object belongs to a group or a multistate, the corresponding group or multistate is selected in the OI Mimic Editor.
- If the selected object is a feature (as animation, action, …), the owner object is selected in the OI Mimic Editor.

Multi-selection is available with a key-sequence: shift / left mouse click.

Unselect an object in a multi-selection is available with the same key-sequence: shift / left mouse click.

- **List of items**

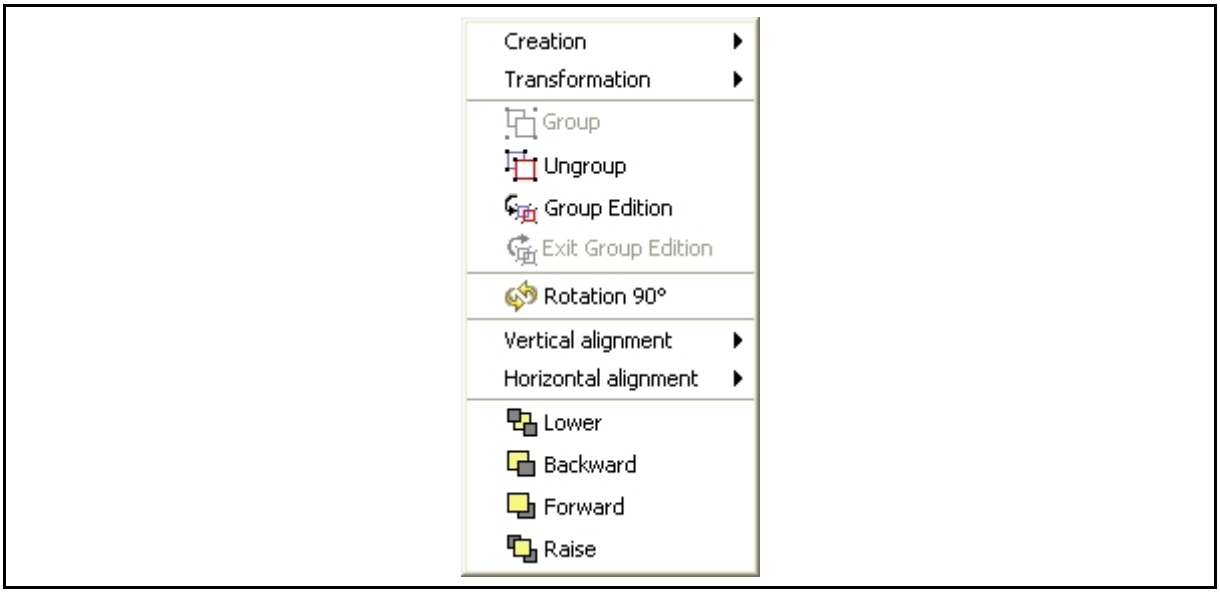



FIGURE 139 - GRAPHIC/OI MIMIC ITEMS

Hereafter, a full description of theses items with this classification:

- creation,
- transformation and rotation,
- group management,
- alignment,
- layer management.

#### 4.4.2.1 Graphic/Creation sub-menu

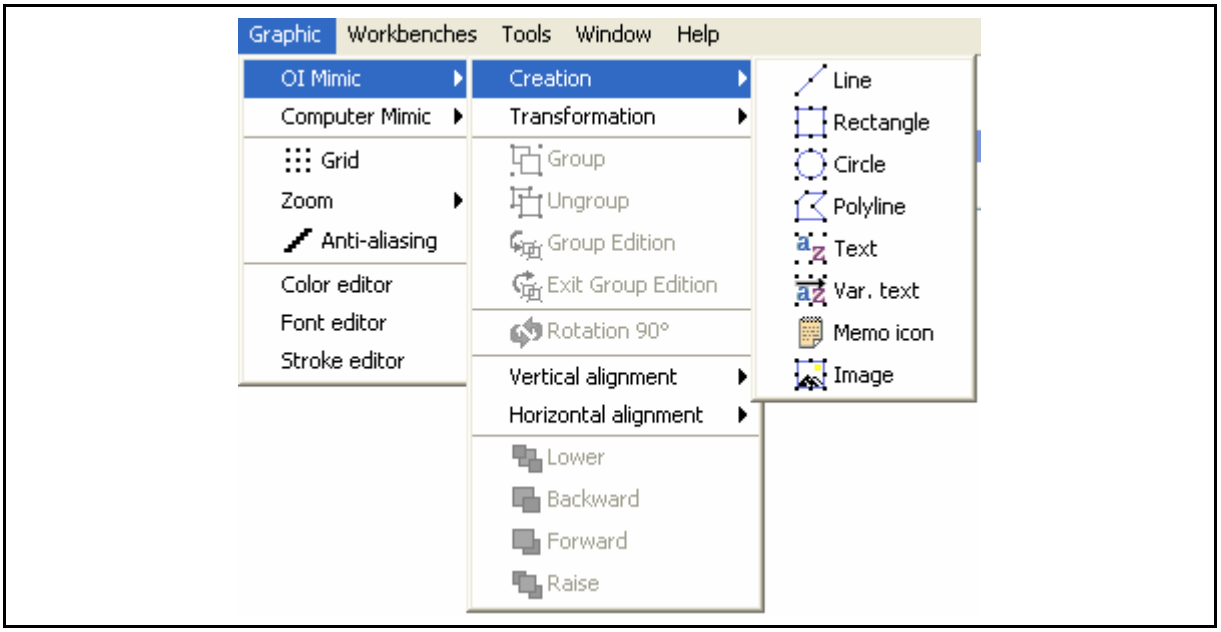



FIGURE 140: GRAPHIC/OI MIMIC/CREATION ITEMS

Purpose:

- Create a basic graphic object. Creation is interactive: the position and the size of created object are given by the user with mouse. The new object is added at bottom of navigator parent object list.

Availability:

- When a graphic object or a mimic is selected from navigator or from Mimic viewer.

Other call:

- OI Mimic toolbar.
- Object entry area: select the type of object to add. This way is not interactive. The object is created with default values at the upper left corner. If an object already exists at this position, the new object position is translated below the existing object(s).

List of available basic objects:

| | | |
|---|---|---|
| | Line | |
| | Rectangle | |
| | Circle | |
| | Polyline | |
| | Text | Text field |
| | Var.Text | Variable text: the content of this text field is defined on run-time. This kind of object can be linked to a datapoint, and the text is then the current value/state of this datapoint. |
| | Memo.Icon | The icon is animated by memo messages entered on run-time at PACiS OI. This creation is not interactive: the new memo icon is created at the upper left corner. |
| | Image | Insert picture/Photo from file |

Operation:

1. Select Parent graphic object: a mimic or another graphic object.

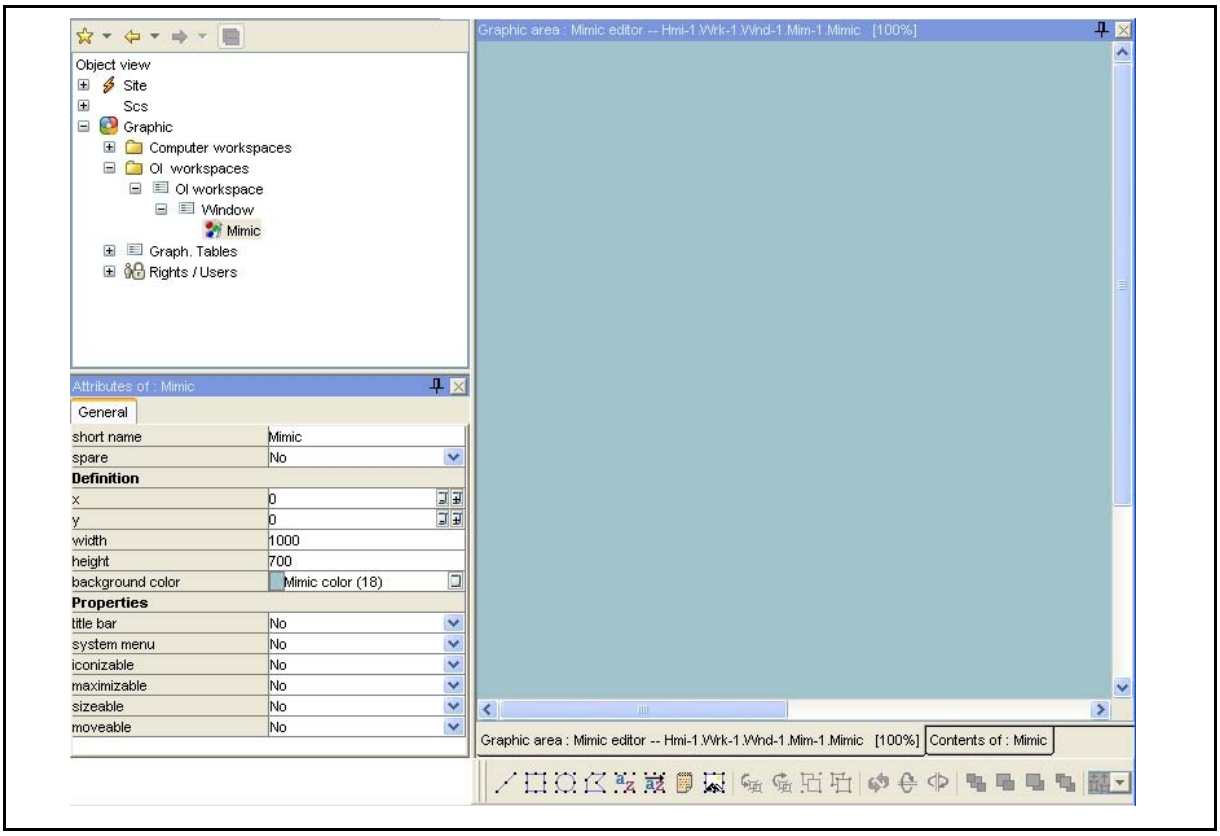



FIGURE 141 - OI MIMIC INTERACTIVE CREATION

2. Select the type of object to create (line in example).
3. A cross cursor appears in OI Mimic editor: press the mouse button at the desired position, drag the mouse until the desired dimension, and release the mouse button. The line is created at the given position with the given size.
4. The object Line appears in navigator below its parent.
5. Attribute editor is updated with the attributes of the new object. Object attributes can be adjusted. For a line, its position, stroke type or stroke color.

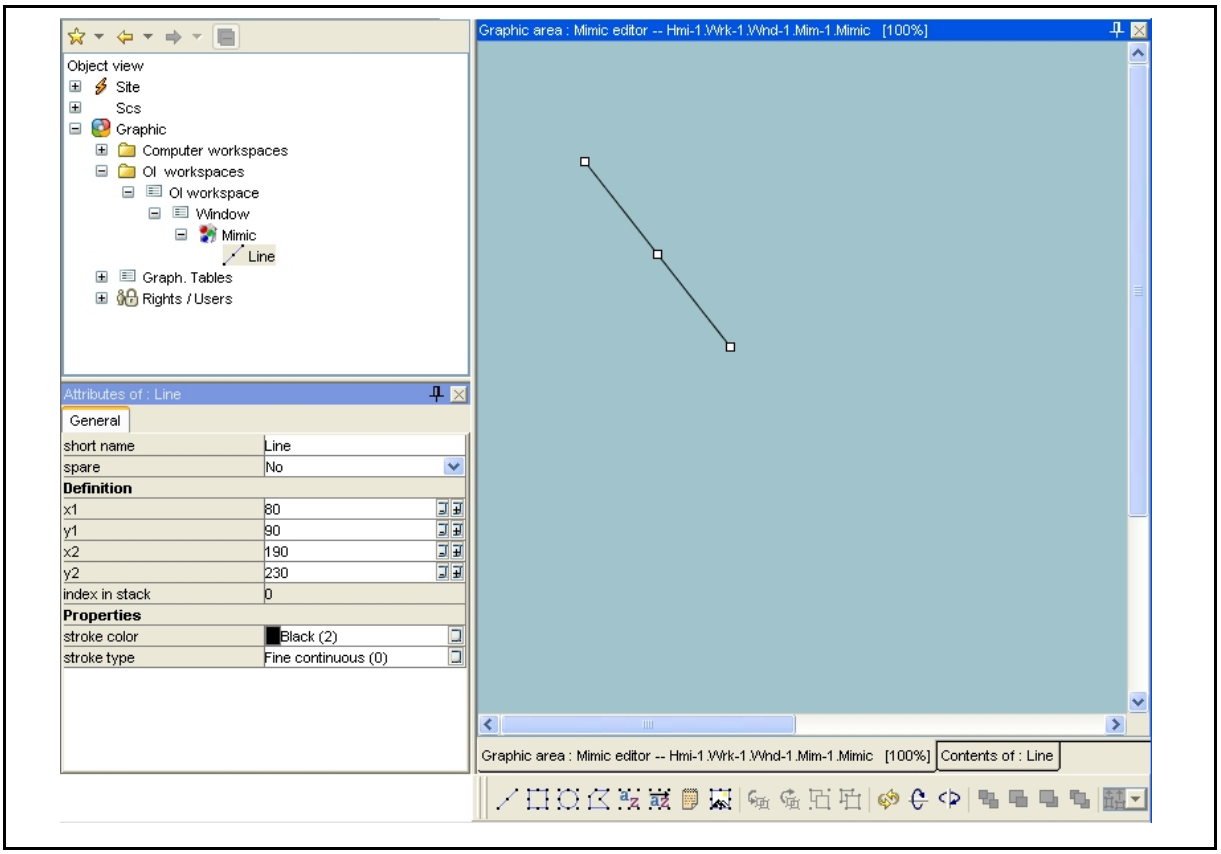



FIGURE 142 - OI MIMIC INTERACTIVE CREATION RESULT

4.4.2.2 Graphic/Transformation sub-menu and Rotation item

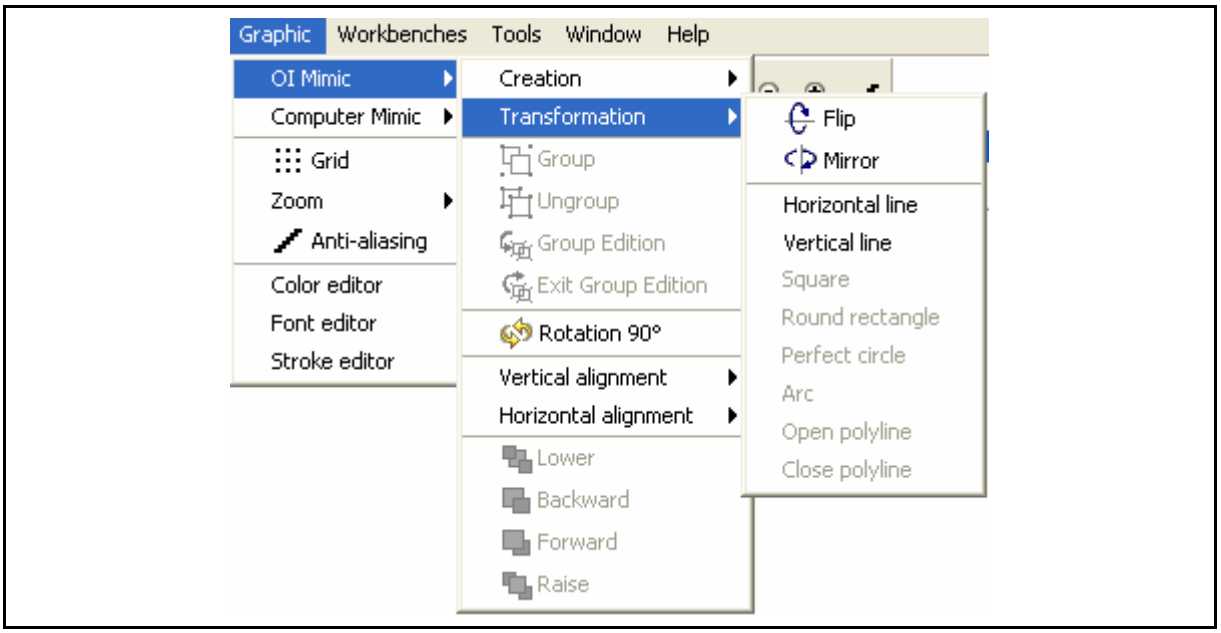



FIGURE 143: GRAPHIC/OI MIMIC/TRANSFORMATION SUB-MENU

Purpose:

- Transform a graphic object:

| | | |
|---|---|---|
| | Flip | Symmetry upon horizontal axis |
| | Mirror | Symmetry upon vertical axis |
| | Horizontal Line | Projection of **line** on Vertical axis |
| | Vertical Line | Projection of **line** on Horizontal axis |
| | Square | **Rectangle** is forced to be perfect square |
| | Round rectangle | **Rectangle** corner is rounded |
| | Perfect Circle | **Circle** is forced to be perfect circle |
| | Arc | **Circle** arc is forced to be semi-arc |
| | Open polyline | Linear segment between last and first **polyline** point is not drawn |
| | Close polyline | Linear segment between last and first **polyline** is drawn |
| | Rotate 90° | **Rotate** from 90° the selected object, left direction. Any basic graphic object could be rotated **except** text, var.text and Image objects. |

In **bold**, the type of object for which the transformation is applied.

Availability:

- Depending on the selected element.

Other call:

- OI Mimic Toolbar for Flip, Mirror or Rotate 90°
- Contextual menu of the selected graphic object to transform. For example:

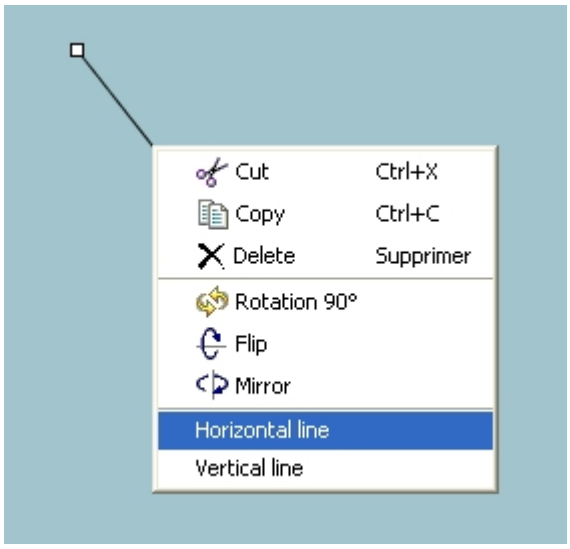



FIGURE 144 - OI MIMIC TRANSFORMATION CALL

Operation:

1. Select the graphic object to transform.
2. Select the available transformation for this kind of object. See the description table. In bold, the good type of object for the transformation.
3. The transformation is applied to the selected object. Its graphical representation is updated. For example for the previous line and Horizontal line transformation:

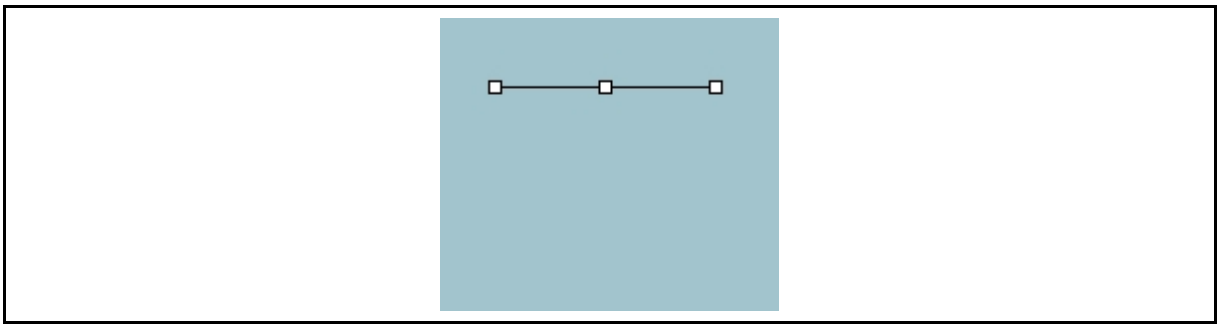


FIGURE 145 - OI MIMIC TRANSFORMATION RESULT

4.4.2.3 Graphic/Group sub-menu

FIGURE 146 - GRAPHIC/OI MIMIC/GROUP ITEMS

Purpose:

- Manage groups of graphic objects.
  A group is a **container of graphic objects**. A graphic object could be also a group. So, you can have a group of group, recursively...
  A group can be handled as a basic graphic object: move, resize, cut, copy, paste, etc.

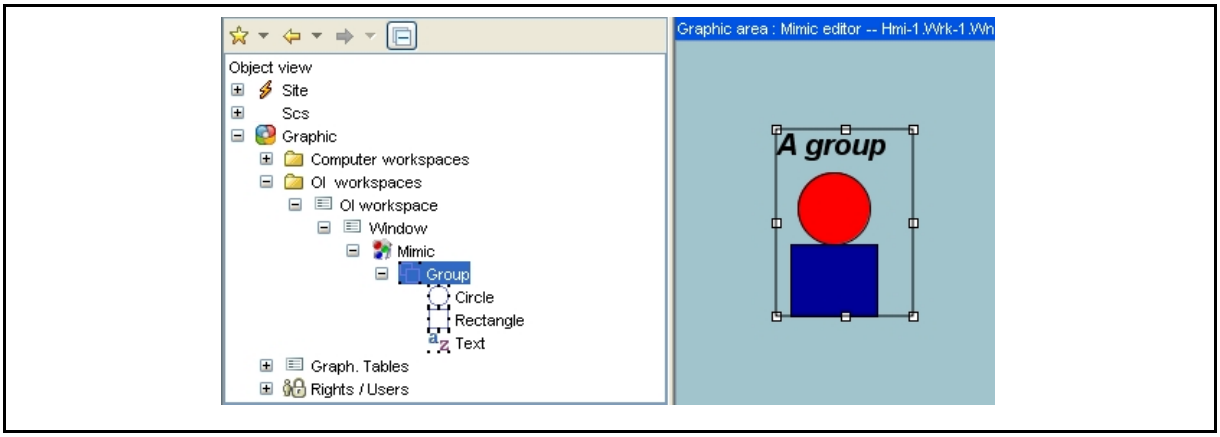



FIGURE 147 - A GROUP IN NAVIGATOR AND OI MIMIC VIEWER

- A specialised group has been defined for PACiS SCE application: a multiState. A **multiState** is a **group of symbols**. Each symbol represents the state of a datapoint. A symbol could be a basic graphic object, a group or another multiState. A complete description of its application and its relations is done in chapter Application of equipment OI. The creation of a multiState is available only from Object entry area. It is not possible to ungroup a multiState.

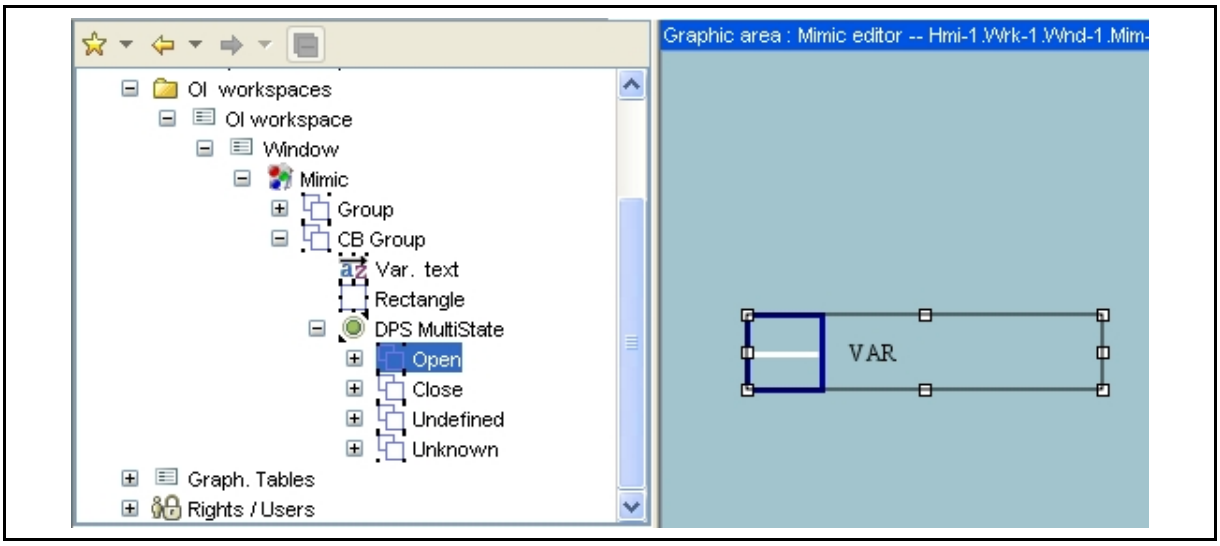



FIGURE 148 - A SPECIALISED GROUP: THE MULTISTATE

- When a group is selected, these components can not be edited individually: move, resize, etc. A special edition mode is available to edit the components of an existing group.

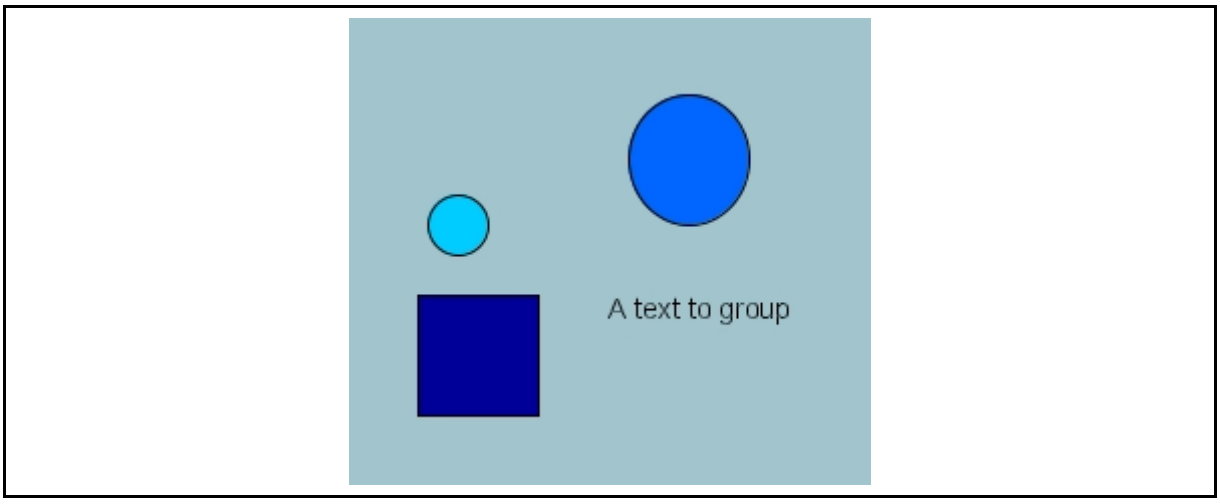



FIGURE 149 - GROUP EDITION

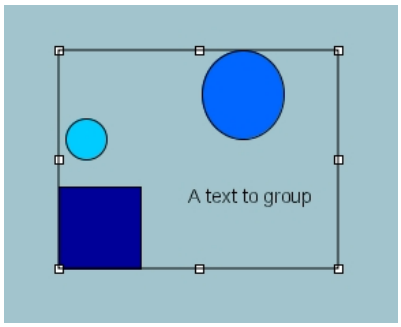
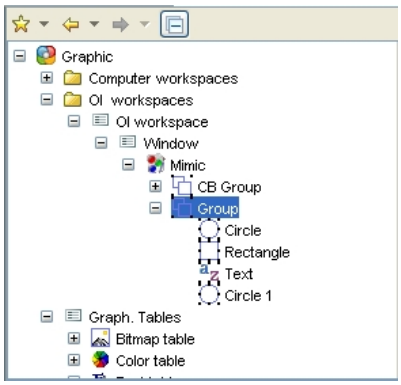
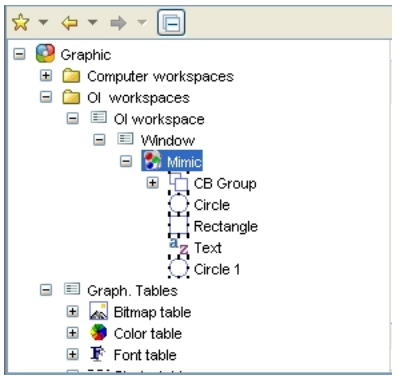
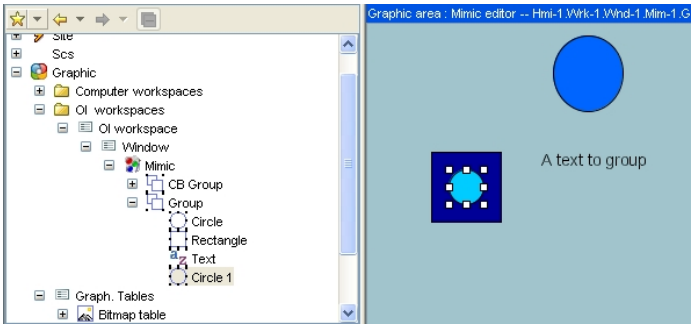
Availability:

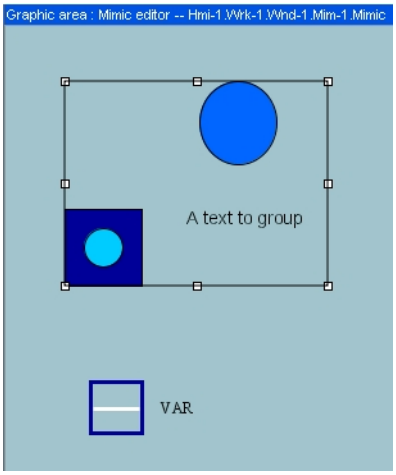
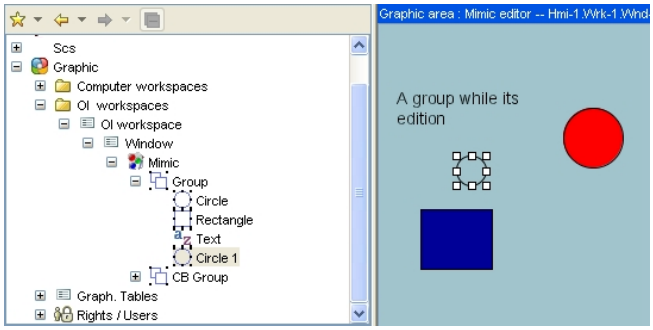
- Group: when at least two graphic objects are selected. Multi-selection is available with shift / left mouse click.
- Ungroup: when a group is selected. This item is not enabled for MultiState.
- Group edition: when a group or a multiState is selected. The selected object can be an inner group: a group of group. In this last case, the selection must be done with navigator; OI mimic viewer represents only first level group.
- Exit group edition: when a group or a multiState is going to edit.

Other call:

- OI Mimic ToolBar.
- Contextual menu when a group is selected (right click): ungroup and group edition

Operation:

| | | |
|---|---|---|
| | Group | 1. select several graphic objects with mouse: shift / left mouse click<br>  <br>2. select group item. A new group is created. The selected objects are moved under this new group. The mimic viewer and the navigator are updated.<br>  <br>  |
| | Ungroup | 1. select a group<br>2. select ungroup item. The group is deleted. The objects of the group are moved at the same level as the deleted group.<br>  |

| | | |
|---|---|---|
| | Group edition | 1. select a group or multiState.<br>2. select group edition item: the mimic viewer is cleared and is filled with the objects of the selected group or multiState.<br>3. edit and arrange all children of edited group or multiState:<br>  |
| | Exit group edition | 1. while group edition, select Exit group edition: the mimic viewer is cleared and filled with the whole mimic. The components of the group can not be edited yet:<br>  |

4.4.2.4 Graphic/ Alignment sub-menus

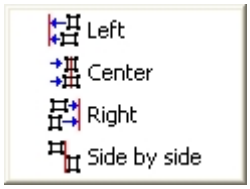



FIGURE 150 - GRAPHIC/OI MIMIC/VERTICAL ALIGNMENT ITEMS

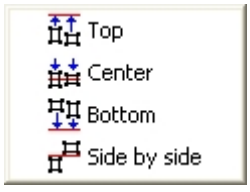



FIGURE 151 - GRAPHIC/OI MIMIC/HORIZONTAL ALIGNMENT ITEMS

Purpose:

- Align selected graphic objects

Availability:

- Two graphic objects must be selected at least in OI mimic viewer.

Other call:

- OI Mimic Toolbar

| | | |
|---|---|---|
| | Left | Align left selected objects |
| | Centre | Centre selected objects |
| | Right | Align right selected objects |
| | Side by side | Reorganise objects side by side |
| | Top | Align top selected objects |
| | Centre | Centre selected objects |
| | Bottom | Align top selected objects |
| | Side by side | Reorganise objects side by side |

Operation:

1. Select the graphic objects to align, at least two objects. Multi-selection is available with shift / left mouse click.

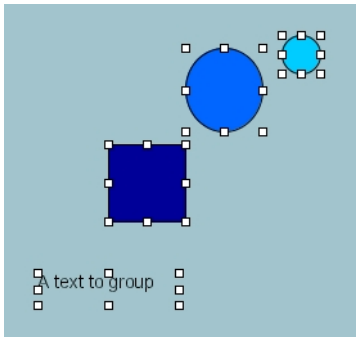



FIGURE 152 - OI MIMIC ALIGNMENT PREPARATION

2. Select the alignment rule to apply.
3. The alignment is applied to the selected objects. The position of each selected object is updated with the given rule. Their graphical representation is updated. For example, with :

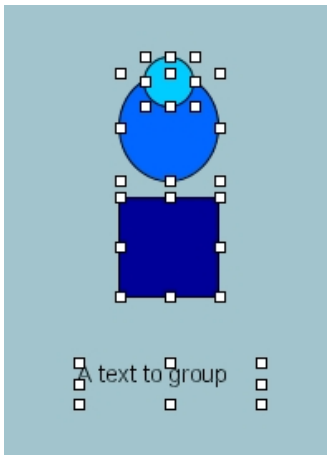



FIGURE 153 - OI MIMIC ALIGNMENT RESULT

4.4.2.5 Graphic / Layers sub-menu

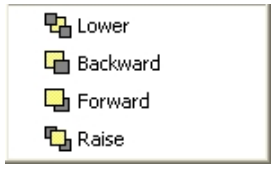



FIGURE 154 - GRAPHIC/OI MIMIC/LAYERS ITEMS

Purpose

- modifies the stack position of graphic objects which are superposed. This defines which objects will be on top or behind the selected object. This mechanism can be represented by a stack: the bottom of the stack is behind the top of the stack.

Availability:

- only one graphic object is selected.

Other call:

OI Mimic Toolbar

| | | |
|---|---|---|
| | Lower | Set the object at the bottom of the stack |
| | Upper | Set the object at the top of the stack |
| | Backward | Move back the object of one position in the stack |
| | Forward | Move up the object of one position in the stack |

Operations:

1. Select one graphic object.

In the following example, the selected object, the middle red circle, is in second position in the stack. Left white circle is in top position, right blue circle is in third position and blue rectangle is in bottom position.

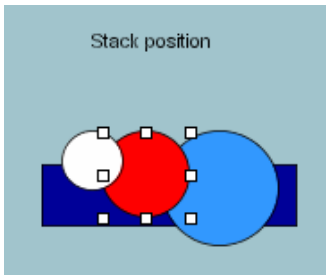



FIGURE 155 - OI MIMIC STACKED OBJECT SELECTION

2. Select the layer item. The stack position of the selected object is modified. The graphical representation of the selected object and of the stacked objects is updated. For example, with , lower, middle red circle is then in last position:

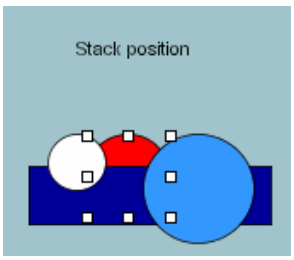



FIGURE 156 - OI MIMIC LAYERS RESULT

### 4.4.3 Computer mimic

As all objects, the Computer Mimic graphic objects can be manipulated from the **Navigator** and **Attribute Editor**. Nevertheless, the **Computer Mimic Editor** is helpful to create graphic objects, by showing a graphical representation of the objects. The Computer Mimic menus items allow to create and modify Computer Mimic objects through Computer Mimic Editor.

Only available items of Computer mimic are described and not the way to configure completely a bay mimic. This way is described in the chapter Application of equipment C264. This chapter describes how to configure a computer and its bay mimic. In particular, it describes all links of a bay mimic and its components with electric topology (bay, module, datapoint).

Before a full description of theses items, a brief description of Computer mimic editor:

- **View and specific toolbar**

The Computer mimic is displayed in the graphical area. A specific toolbar can be displayed with window/Computer mimic toolbar item. This toolbar contains some Computer mimic item shortcuts.

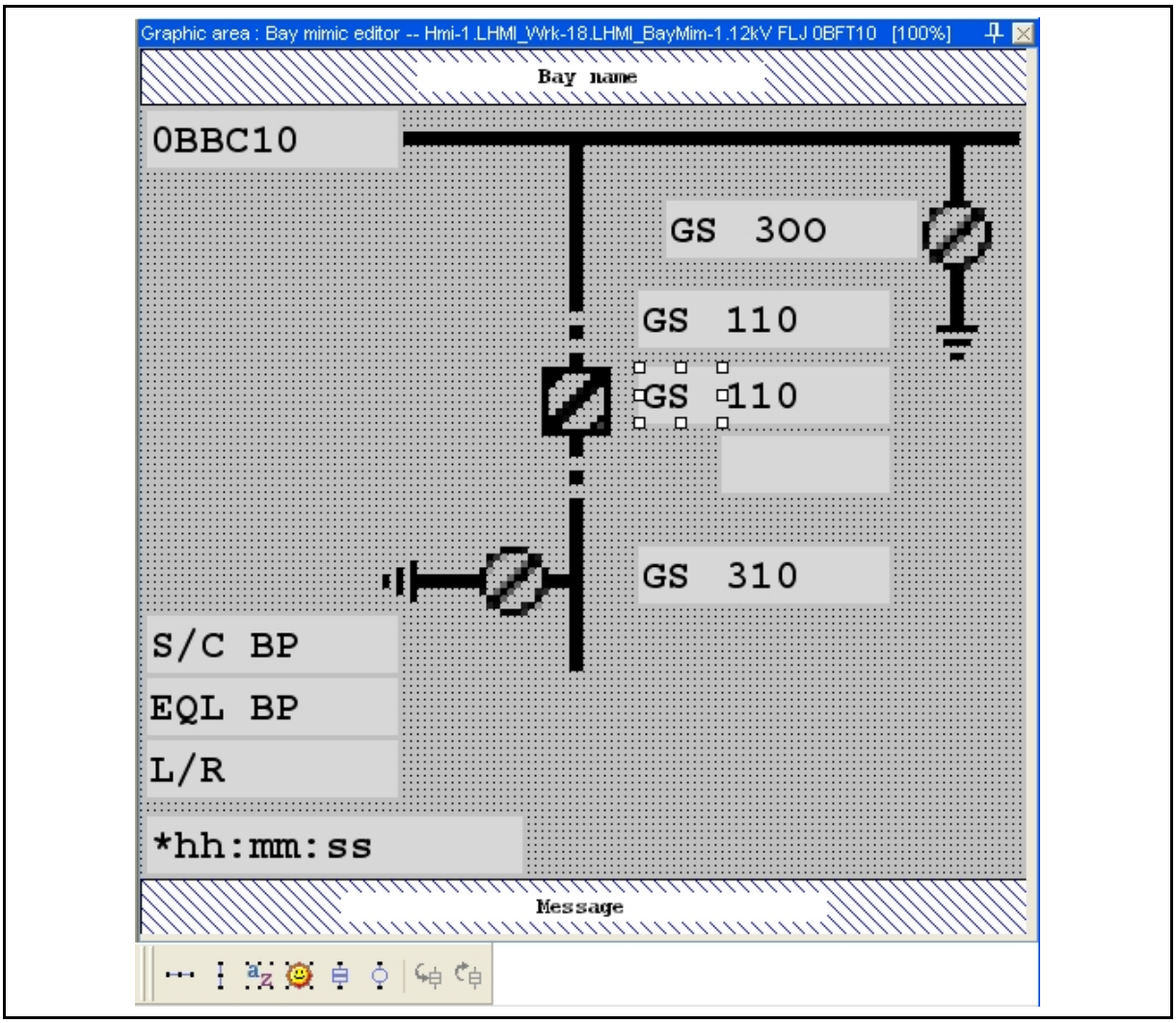



FIGURE 157 - COMPUTER MIMIC EDITOR AND ITS TOOLBAR

- **Content**

The content of Computer Mimic depends on the selected object in the Navigator.

- If the selected object is a bay mimic or a component of a bay mimic, the Computer Mimic Editor contains the graphical representation of the bay mimic.
- If the selected object belongs to a module , the corresponding module is selected in the **Computer Mimic Editor**.

The Navigator and the Computer Mimic Editor are linked together: any modification done in the Computer Mimic Editor is also visible in the Navigator and/or in the Attributes Editor. Reversibly, any modification done in the Navigator or in the Attributes Editor is also visible in the Computer Mimic Editor (if the modification has a graphical effect).

- **Selection**

The selected object in the Computer Mimic Editor depends on the selected object in the Navigator. More precisely:

- If the selected object is a bay mimic, no object is selected in the Computer Mimic Editor.
- If the selected object belongs to a module, the corresponding module is selected in the Computer Mimic Editor.

Multi-selection is available with a key-sequence: shift / left mouse click.

Unselect an object in a multi-selection is available with the same key-sequence: shift / left mouse click.

- **List of items**

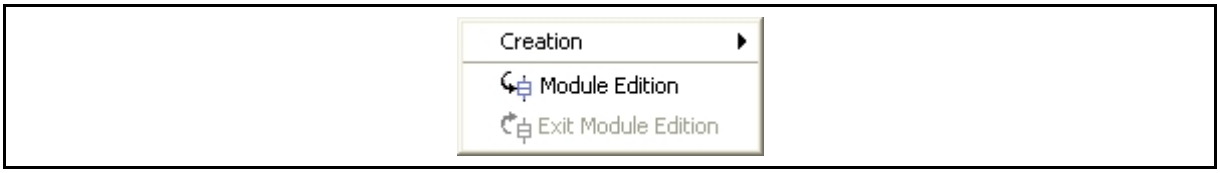



FIGURE 158 - GRAPHIC/COMPUTER MIMIC ITEMS

Hereafter, a full description of theses items with this classification:

- creation,
- module management

#### 4.4.3.1 Graphic/Creation sub-menu

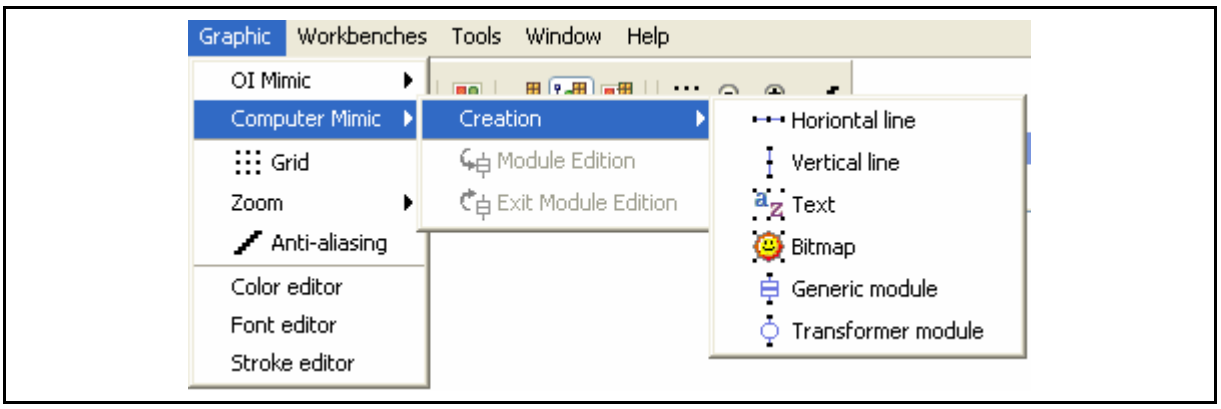



FIGURE 159: GRAPHIC/COMPUTER MIMIC/CREATION ITEMS

Purpose:

- Create a basic graphic object. Creation is not interactive: the object is created with a default position and a default size. The new object is added at bottom of navigator parent object list.

Availability:

- When a graphic object or a mimic is selected from navigator or from Mimic viewer.

Other call:

- Computer Mimic ToolBar.
- Object entry area: select the type of object to add.

List of available basic objects:

| | | |
|---|---|---|
| | Horizontal Line | |
| | Vertical line | |
| | Text | A text field. The text must be defined by the user. |
| | Predefined text | Some predefined text fields are available from Object Entry area. |
| | Bitmap | Bitmap defined from bitmap palette (single) |
| | Generic module | Specialised group that represents a generic module. |
| | Transformer module | Specialised group that represents a transformer module. |

Operation:

1. Select Parent graphic object: a bay mimic or another graphic object.

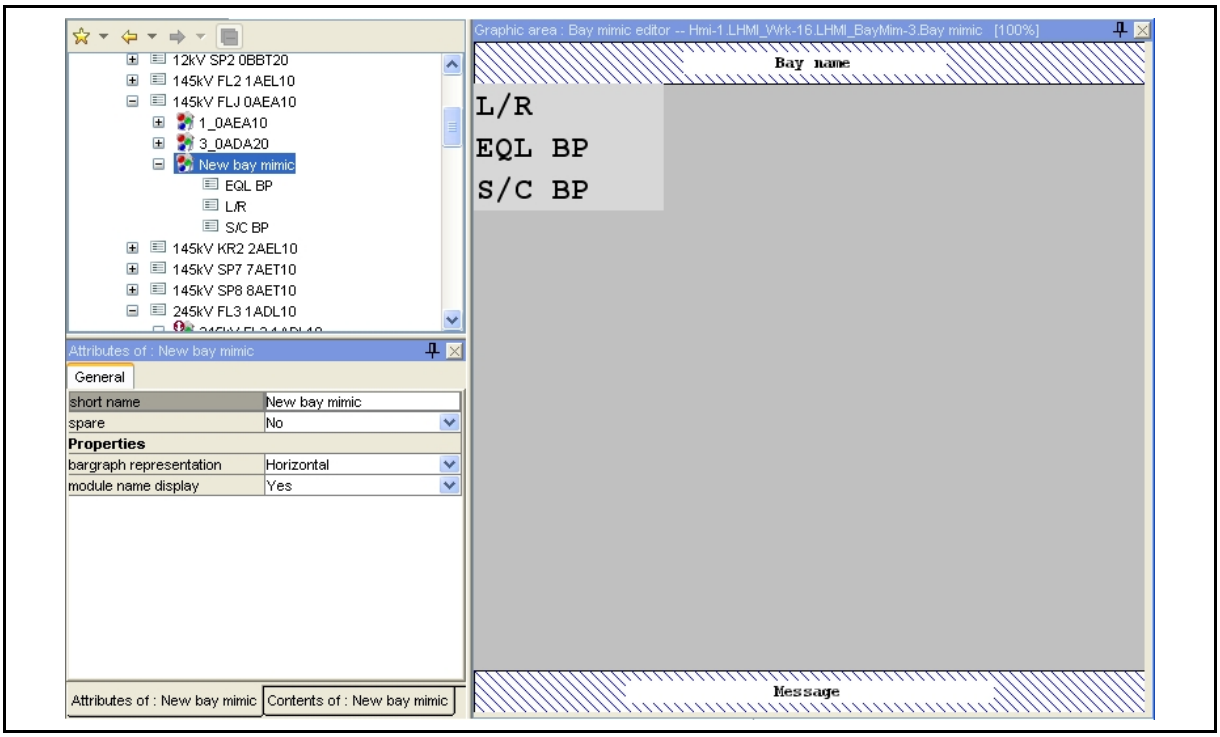



FIGURE 160 - COMPUTER MIMIC CREATION (BEFORE)

2. Select the type of object to create (Generic module in example).

3. The object Generic module appears in navigator below its parent and the Computer mimic viewer is updated with its graphical representation. The module is created with a default position and a default bitmap. This object can be handled like all graphical objects with mouse.

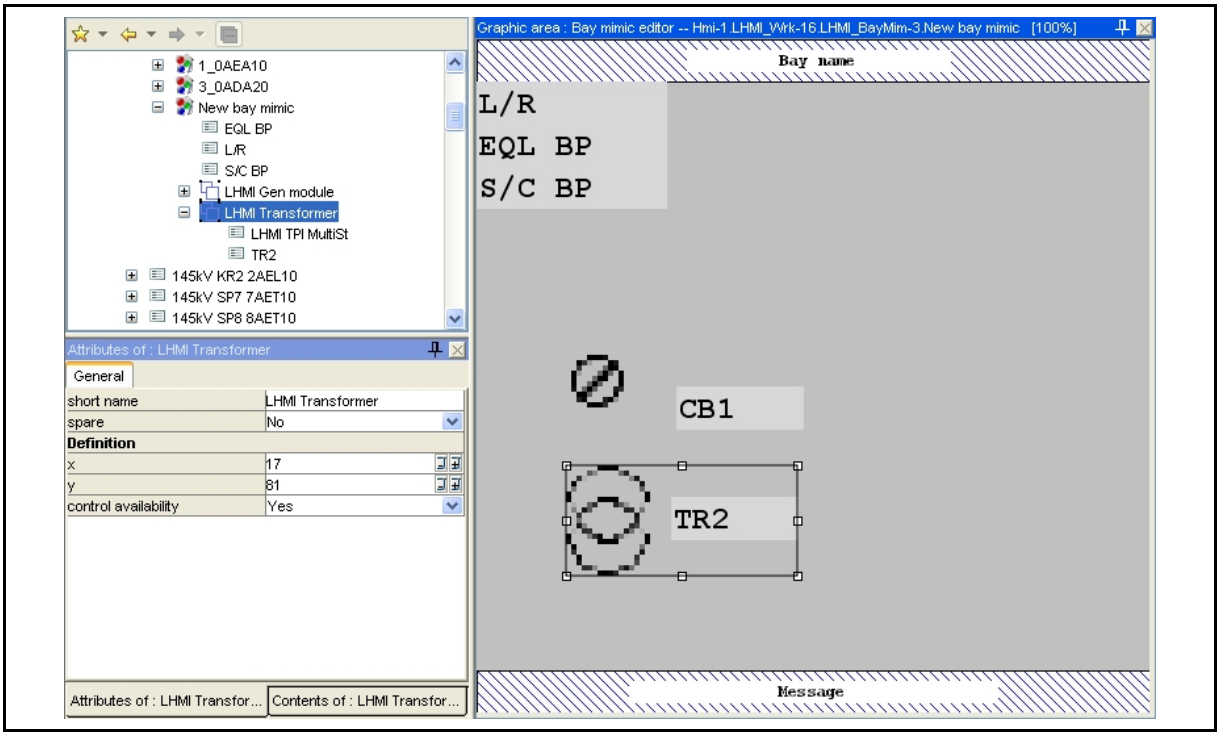



FIGURE 161 - COMPUTER MIMIC CREATION (AFTER)

4.4.3.2 Graphic/Module sub-menu

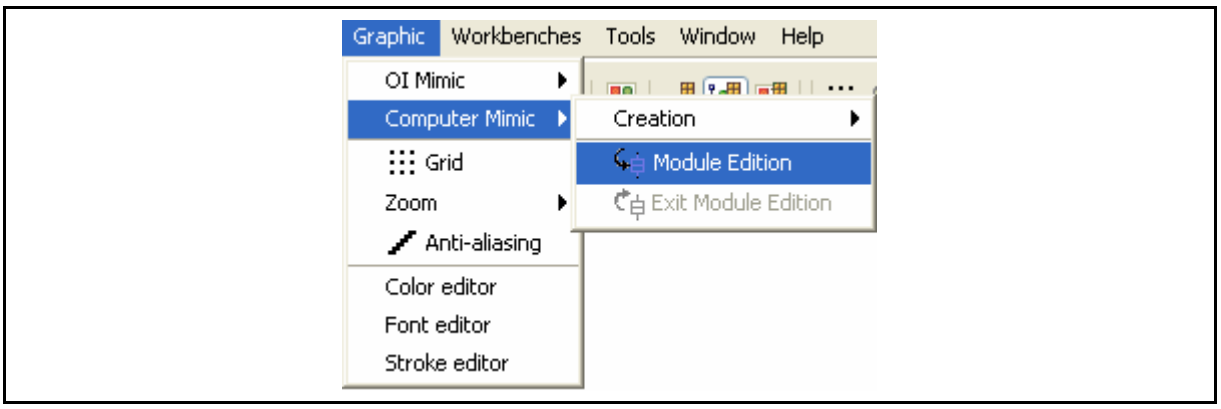



FIGURE 162: GRAPHIC/COMPUTER MIMIC/MODULE ITEMS

Purpose:

- Manage specialised groups of bay mimic: the generic module and the transformer module.
- A group is a **container of graphic objects**.
  A group can be handled as a basic graphic object: move, cut, copy, paste, etc.
- Two specialised groups have been defined for PACiS SCE application and bay mimics: these groups are the graphical representation of electric module.
  A complete description of their application and their relations is done in chapter Application of equipment C264.
  - **Generic module** has two fixed components: the module name and its graphic representation (LHMI xPS MultiSt) for which a bitmap is referenced from bitmap palettes.
  - **Transformer module** has two fixed components: the module name and its graphic representation (LHMI TPI MultiSt) for which a bitmap is referenced from bitmap palettes. Some optional component can be added with Object Entry Area.

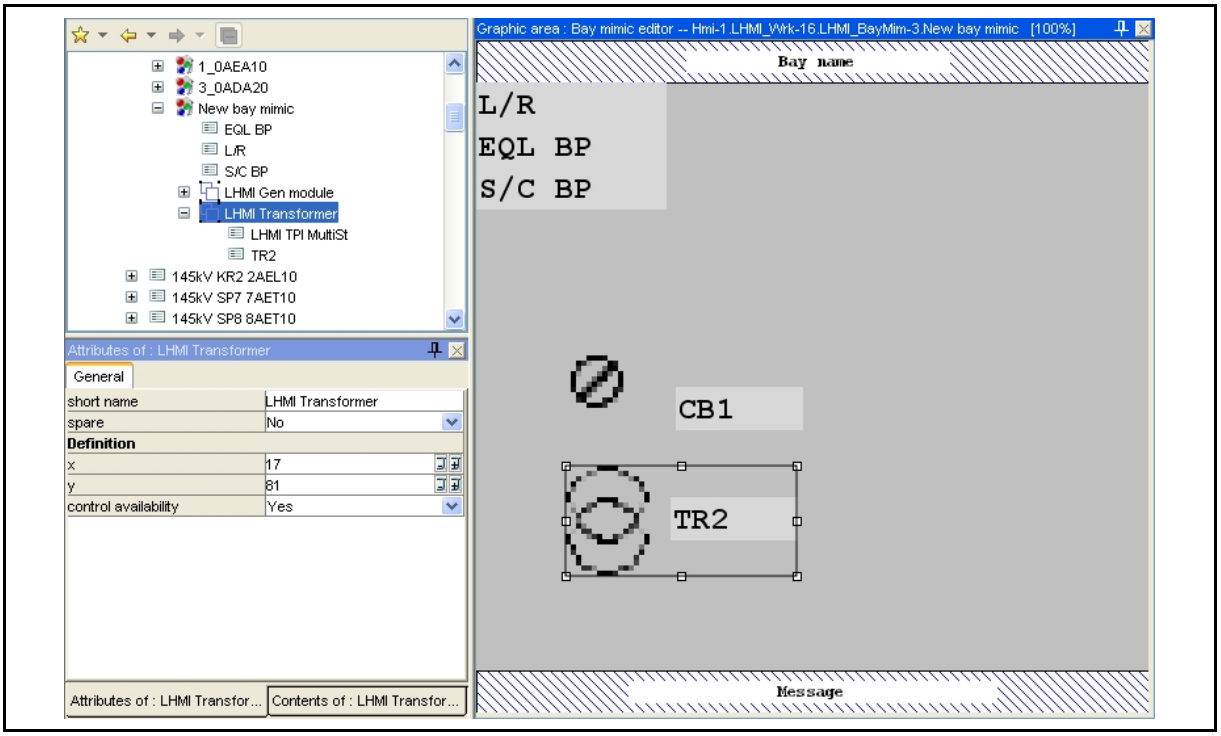



FIGURE 163 - SPECIALISED GROUPS: GENERIC & TRANSFORMER MODULE

- When a module is selected, these components can not be edited individually. A special edition mode is available to edit the components of an existing module.

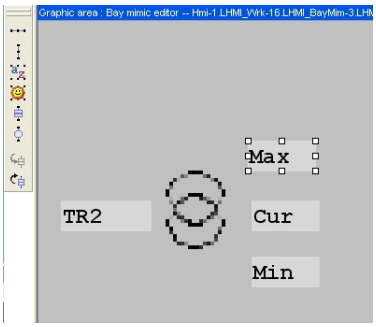



FIGURE 164 - MODULE EDITION

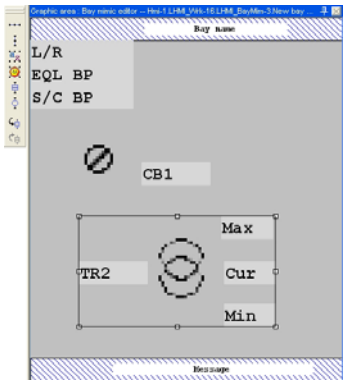
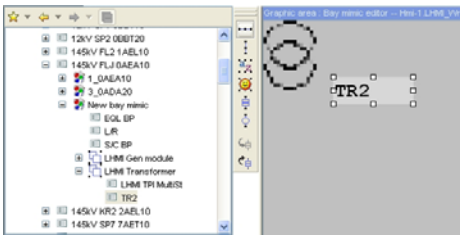
Availability:

- Module edition: when a module is selected.
- Exit module edition: when a module is going to edit.

Other call:

- Computer Mimic ToolBar.
- Contextual menu when a group is selected (right click): group edition

Operation:

| | | |
|---|---|---|
| | module edition | 1. select a module<br>2. select module edition item: the mimic viewer is cleared and is filled with the objects of the selected module.<br>3. edit, add new components and arrange them:<br>  |
| | Exit module edition | 1. while module edition, select Exit module edition: the mimic viewer is cleared and filled with the whole mimic. The components of the module can not be edited yet:<br>  |

### 4.4.4 Graphic/Utility sub-menu

FIGURE 165 - GRAPHIC/UTILITY ITEMS

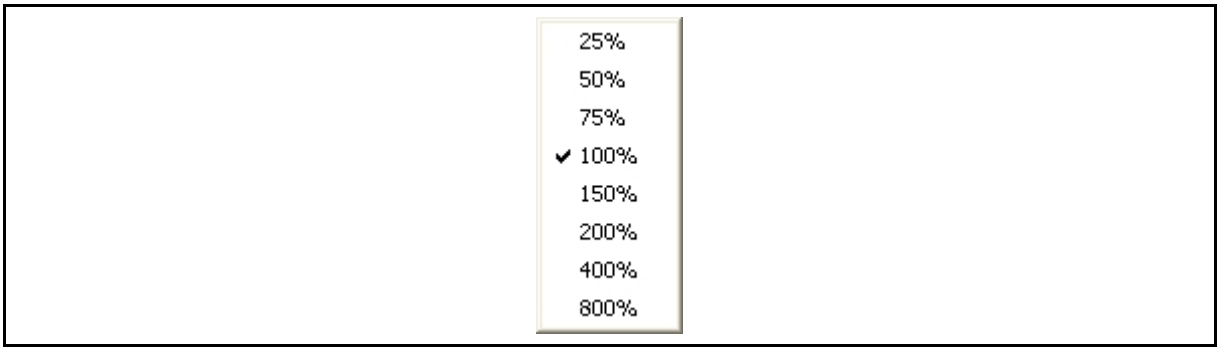



FIGURE 166 - GRAPHIC/ ZOOM ITEMS

Purpose:

- Apply general settings upon graphical objects. Theses items are available for Computer Mimic Editor and for Computer Mimic Editor.

Availability:

- Always

Other call:

- Common toolbar

| | | |
|---|---|---|
| | Grid | Toggle to activate Magnetic Grid. Grid is displayed in the viewer. Any moving with mouse is aligned with the magnetic grid.<br>OI Mimic: the grid is displayed and activated with the grid settings defined with tools/setting function.<br>Computer Mimic: the grid is displayed. The grid is always activated for this editor even if the grid is not displayed. |
| | Zoom | The available zoom factors are different for:<br>OI Mimic: 25%, 50%, 75%,100%, 150%, 200%, 400%, 800%<br>Computer Mimic: 50%, 100%, 200%, 400%, 800% |
| | Anti-Aliasing | Smoothing or anti-alias function |

The following copies illustrate anti-aliasing action.

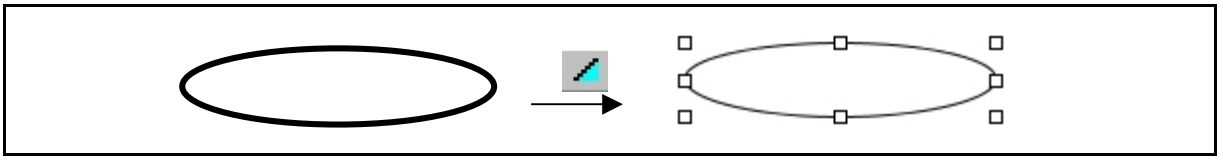


FIGURE 167 - GRAPHIC/ANTI-ALIASING EFFECT

## 4.5 Workbenches Menu

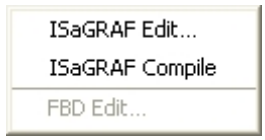



FIGURE 168 - WORKBENCHES MENU

The aim of this menu is to drive actions linked to external tools. The presented tools are:

- ISaGRAF from CJ international used to edit custom automation in IEC61131. This tool could be an option and subject to license.
- FBD editor used to edit Function Block Diagram.

This section describes only **how launching theses tools**.

A user manual of ISaGRAF and FBD is available in chapter PACiS SCE/EN LG.

A complementary description of ISaGRAF and FBD is available in chapter Application of equipment MiCOM C264.

### 4.5.1 Workbenches/ISaGRAF Edit …

Purpose:

- Launch ISaGRAF PRO Workbench, with all element already entered and needed for the tool:
  - name of automation,
  - list of interface variables into dictionary.

Availability:

- ISaGRAF Pro must be installed with its Dongle.

Other call:

- Contextual menu when type of selected object is Slow Automation or C264 PLC

Operations:

1. Select ISaGRAF edit item.

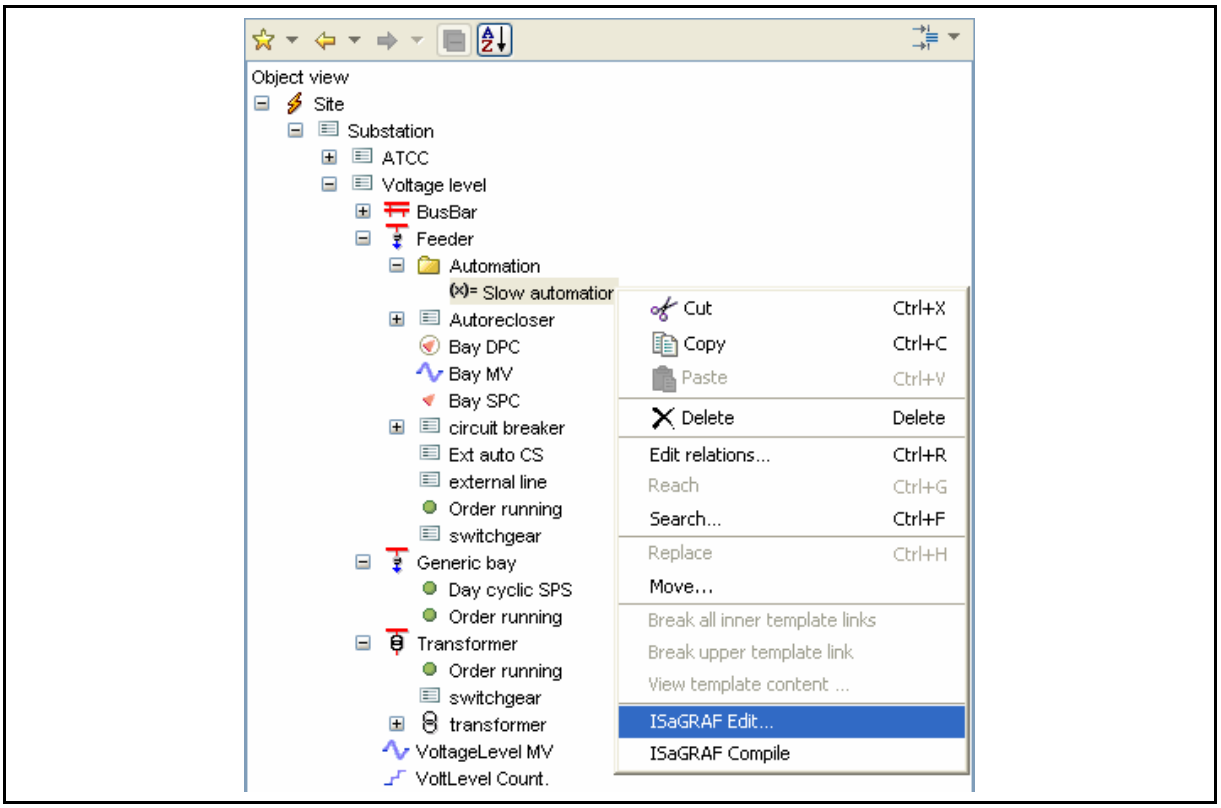



FIGURE 169 - TOOLS/ISaGRAF EDIT FROM SLOW AUTOMATION OBJECT

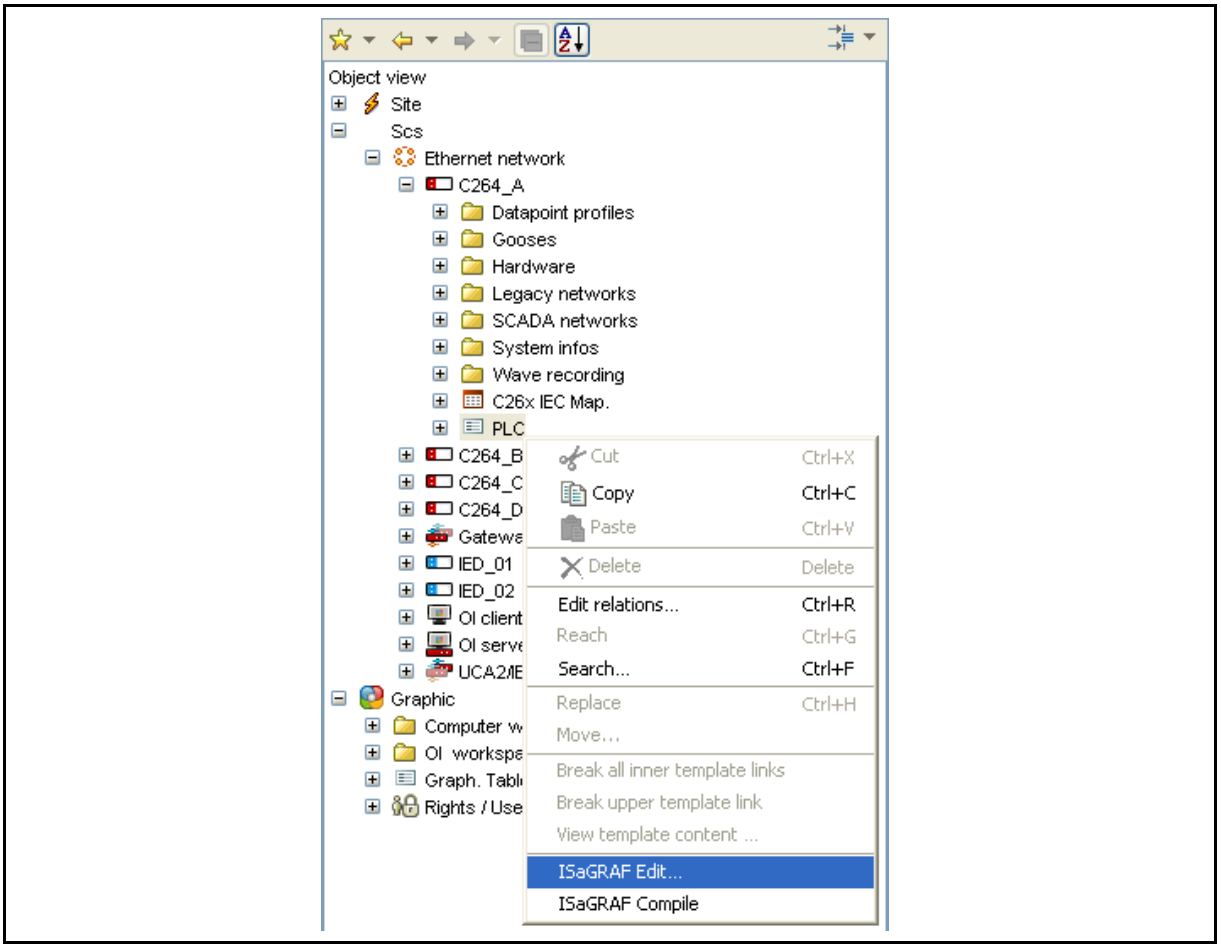



FIGURE 170 - TOOLS/ISaGRAF EDIT FROM C264 PLC OBJECT

2. The ISaGRAF workbench is launched with **modal** mode. Edit the slow automation, save it and quit workbench to come back to PACiS SCE.

4.5.2 Workbenches/ISaGRAF Compile

Purpose:

- Compile/Check ISaGRAF PRO automation made with its Workbench, to verify syntax and make the target files. This operation is made automatically in PACiS SCE File/Generate.

Availability:

- ISaGRAF Pro must be installed with its Dongle.

Other call:

- Contextual menu when type of selected object is Slow Automation or C264 PLC. See Tools/ISaGRAF edit.

Operations:

1. Select ISaGRAF compile on the available object,
2. A popup indicates the result of compilation.

4.5.3 Workbenches/FBD Edit …

Purpose:

- Launch FBD editor which allows to define Function Block Diagram:
  - for logical equation used by interlock,
  - for FBD automation.

Availability:

- Always

Other call:

- Contextual menu when type of selected object is FBD Automation or FBD interlock.

Operations

1. Select FBD edit item on the available object

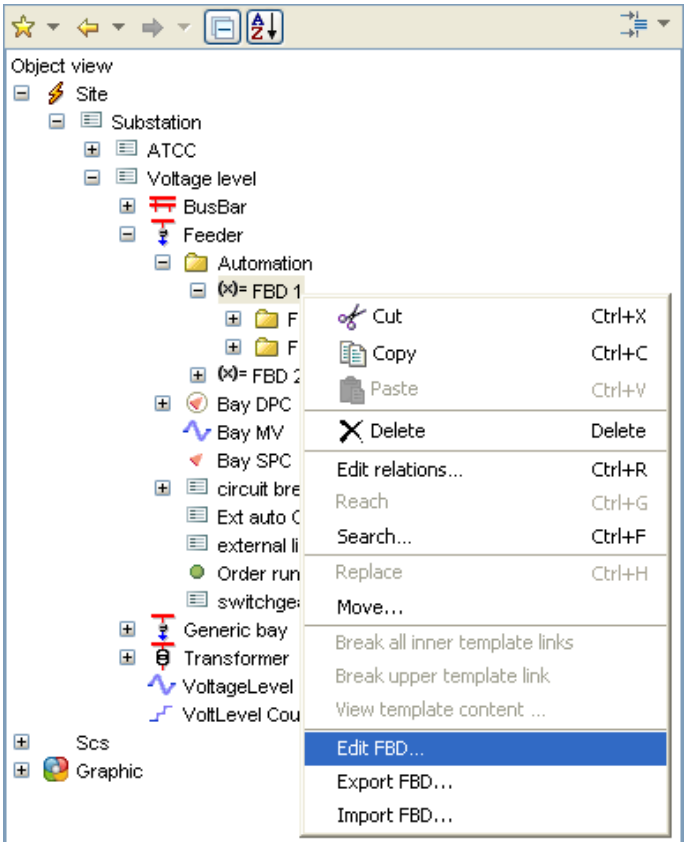



FIGURE 171 - TOOLS/FBD EDIT FROM FBD AUTOMATION

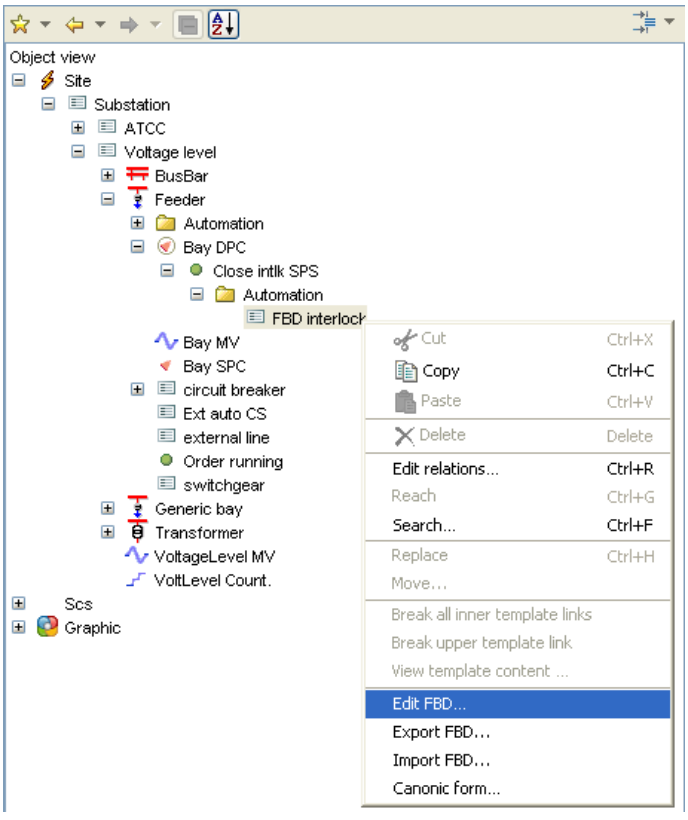



FIGURE 172 - TOOLS/FBD EDIT FROM FBD INTERLOCK

2. The FBD editor is launched for the selected FBD with **modal** mode: the PACiS SCE main editor is hidden during FBD edition. Edit it, save it and quit FBD editor to come back to PACiS SCE. For a complete description of this editor see § 6 FBD Editor.

## 4.6 Tools Menu

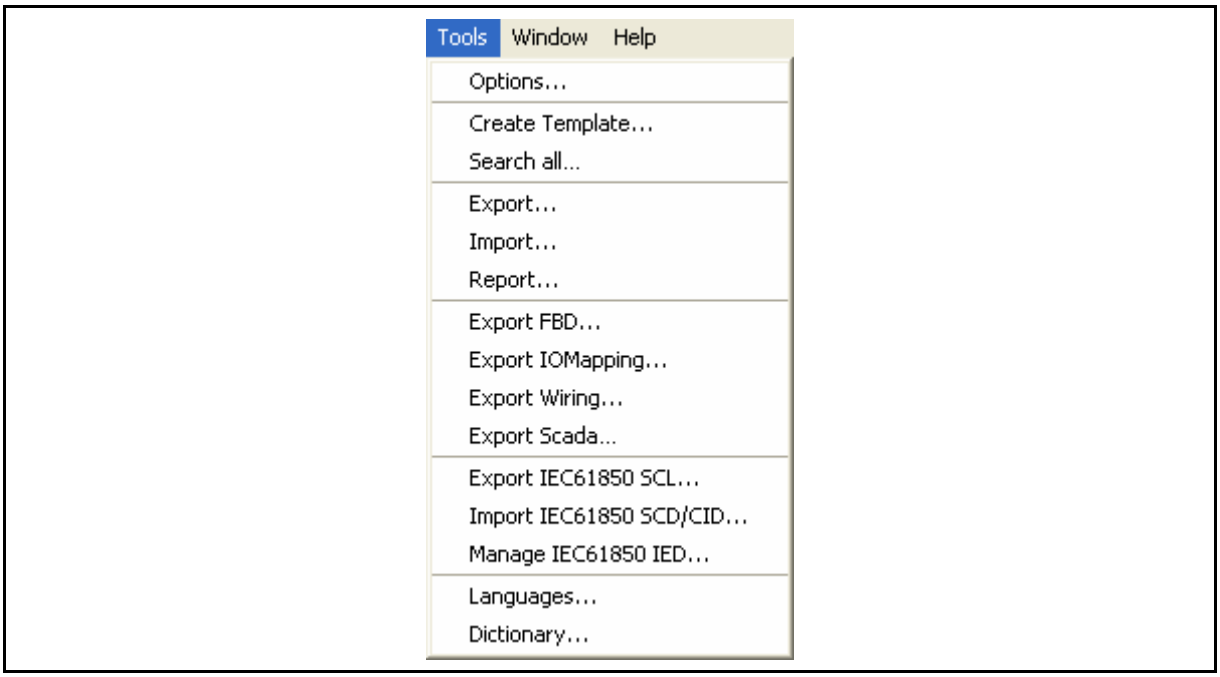



FIGURE 173: THE TOOLS MENU

### 4.6.1 Tools/Options

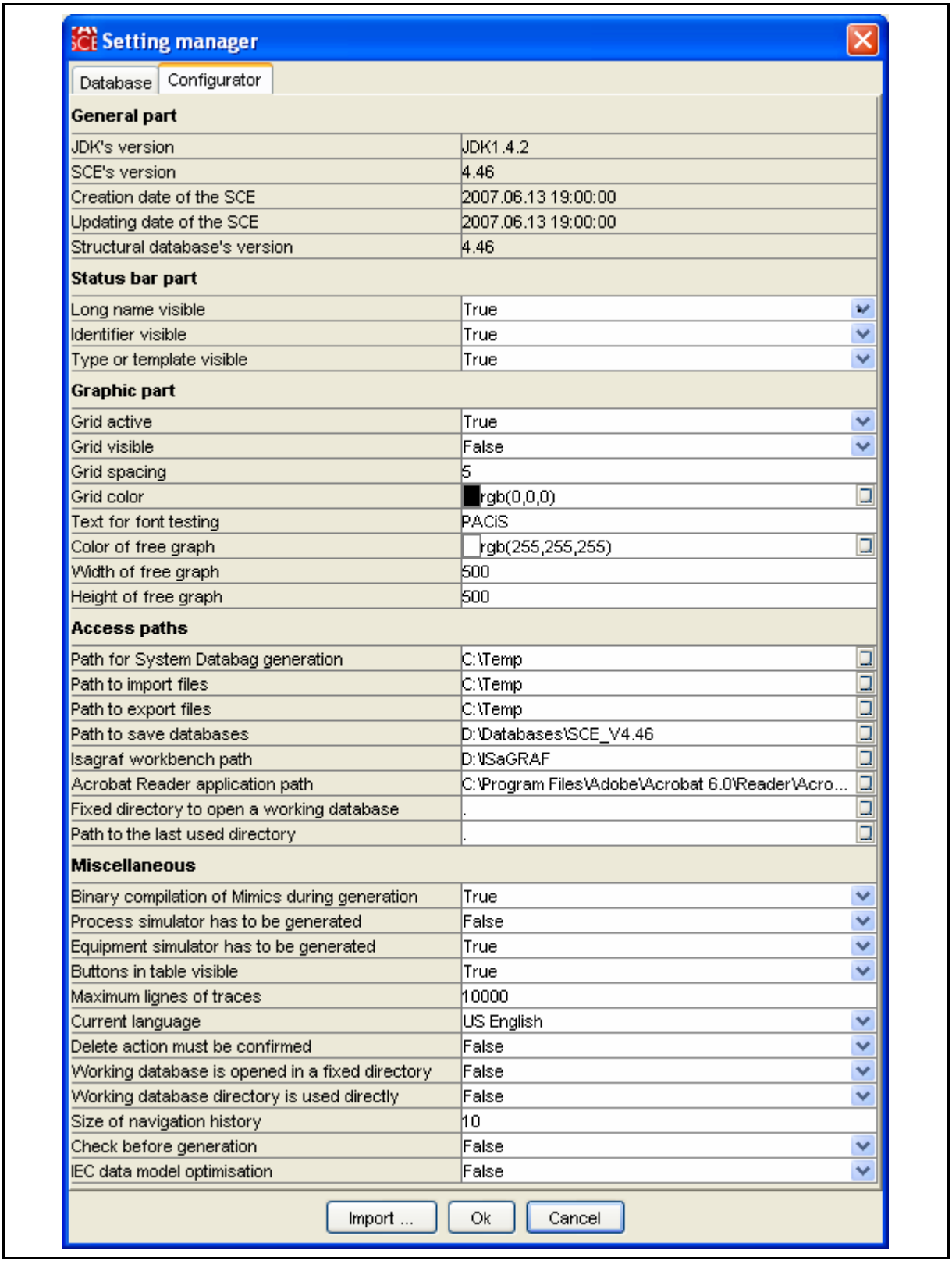



FIGURE 174: TOOLS/OPTION SETTING MANAGER ON PACIS SCE APPLICATION

Purpose: display and allow modification of PACiS SCE settings. The PACiS SCE settings are:

- PACiS SCE Version (including creation date, JDK, data model version),
- parameters upon visibility in status bar,
- parameters upon mimic graphic editors (colour, Mimic editor option,...),

- parameter upon PACiS SCE access directories (tools, component, working directories,…).

Availability:

- Right dependent

Other call:

- File/Properties and select tab Configurator

Operations:

1. Select Tools/Options item
2. Modify the value of updateable setting (white background): * indicates then that the setting has been modified.
3. Restore the previous value of the modified setting with **contextual Restore** (right click on the modified setting).
4. Save the modifications with **Close** button or cancel it with **Cancel** button.
5. A setting of a previous version of PACiS SCE can be imported with **Import** button. From the displayed file chooser, select the PACiS SCE_setting.xml file from installation directory of this old version; then click on Select button.

### 4.6.2 Tools/Create Template…

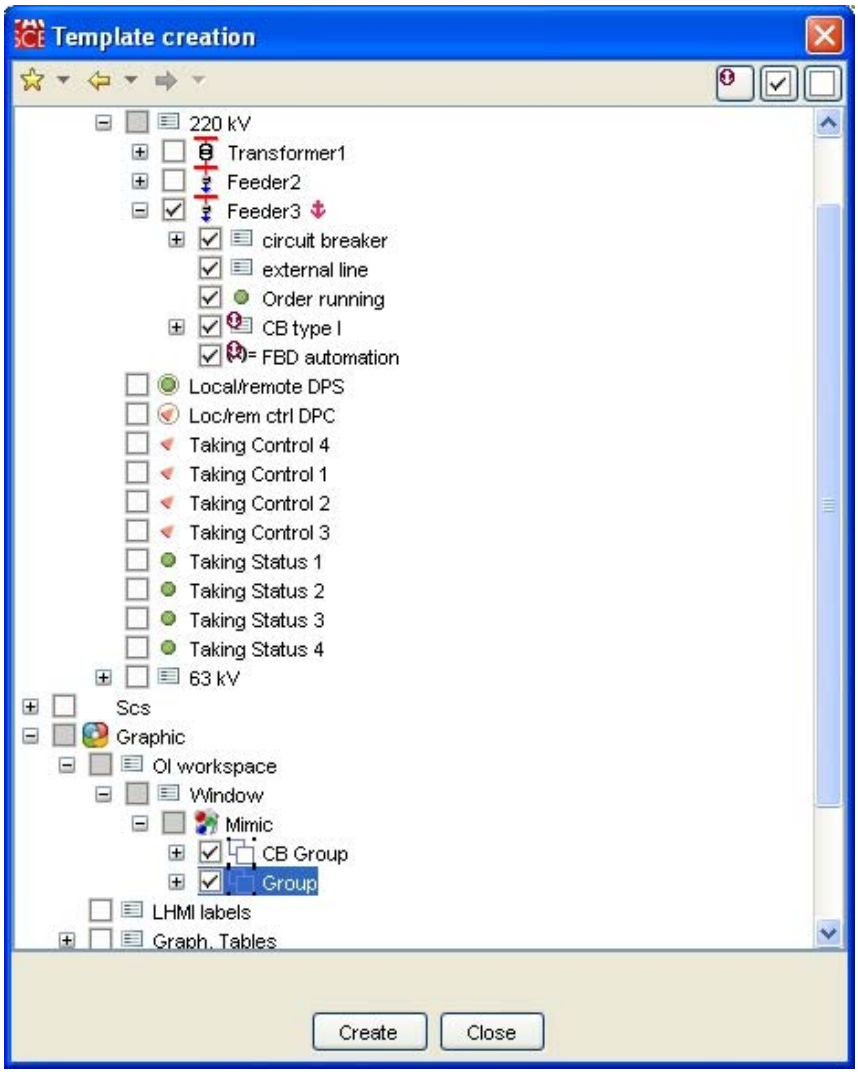



FIGURE 175 - TOOLS/CREATE TEMPLATE CREATION

Purpose:

- Create a new template from the objects hierarchy.

Availability:

- Right dependent

Other call:

- None

Operation:

1. Select Tool/Create template item: a tree view of all objects are displayed.
2. Select objects that will be the components of the new template.
3. Select an object that will be the anchor of the new template. Be care, while an anchor is not defined, the **Create** button is disabled.
4. Click the **Create** button: a new template is added in Templates List. This template contains all selected object. Its name is the name of anchor object.

### 4.6.3 Tools/Search all…

Purpose:

Creation of query from all configuration data. For a complete description of a query and its result, refer to § 4.2.8 Edit/Search…

Availability:

- Right dependent

Other call:

- None

Operation:

- Select **Tools/Search all…** item. The following dialog box is displayed. For a complete description of this dialog box and the next operations, see refer to § 4.2.8 Edit/Search…

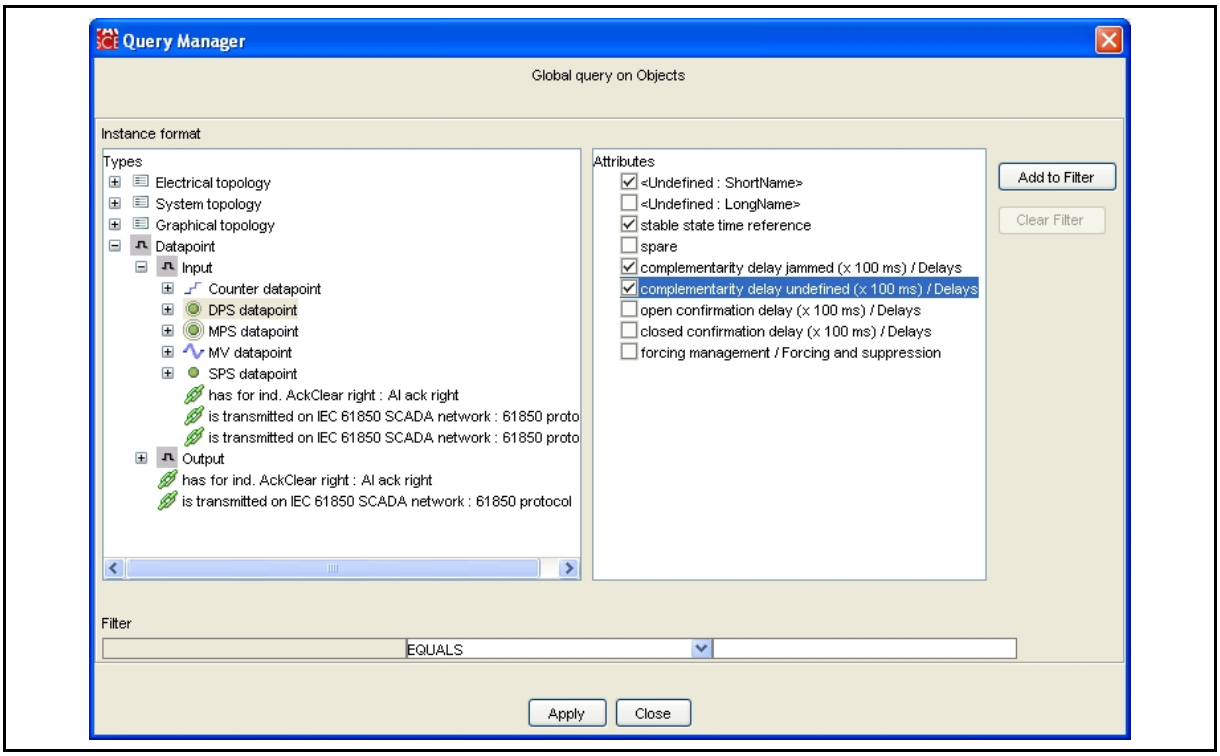



FIGURE 176 - TOOLS/QUERY ITEM

### 4.6.4 Tools/Export, Import sub-menu

The export/import actions allow to export/import a subset of configuration data to/from **XML files**.

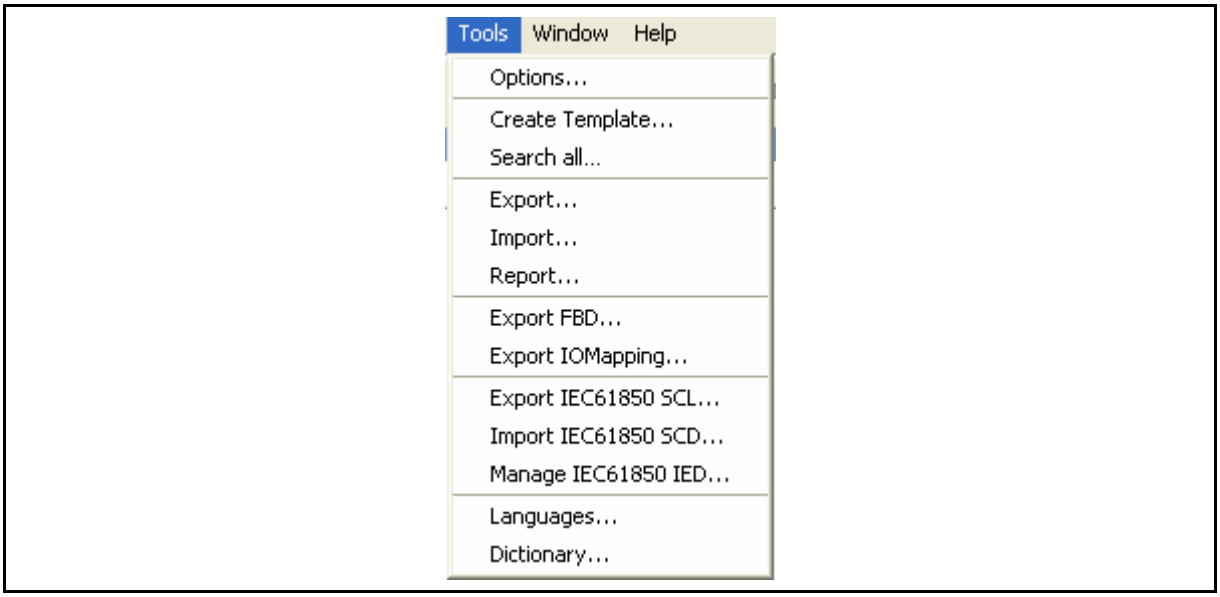
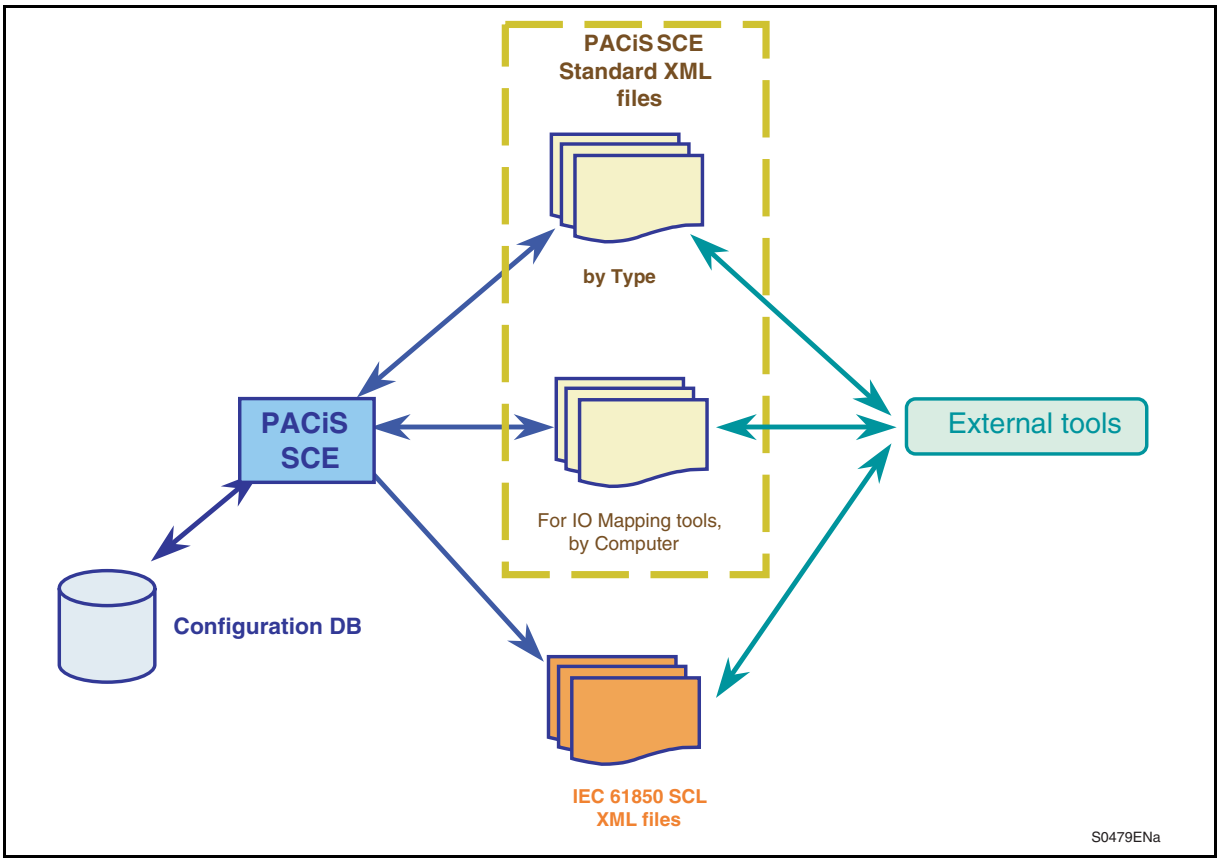



FIGURE 177: TOOLS EXPORT, IMPORT AND REPORT ACTIONS

Several **kinds** of export/import are available:

- **Standard** export/import: a PACiS SCE standard XML format has been defined to exchange any data from/to PACiS SCE.
- **IO mapping** export: a specialisation of standard XML export. This export is limited to computers and their mappings: all datapoints and their linked info (profiles, addresses, …) that are managed by computers.
- **SCL 61850** export: use of IEC 61850 norm to export SBus data.




For export use cases, the **subset of configuration data** is defined by user and depends on the **kind** of exports:

- Standard export: a browser allows to select/deselect some objects/templates sub tree. The result query allows this selection too.
- IO Mapping export: a browser allows to select/deselect some computers.
- SCL 61850 export: a browser allows to select/deselect some IEC61850 devices.

Some **Extra configuration files** attached to data are **excluded** from any import and export actions:

- ISaGRAF and FBD files (Fast and slow automation description)
- Image files included in OI mimics and bay computer mimics

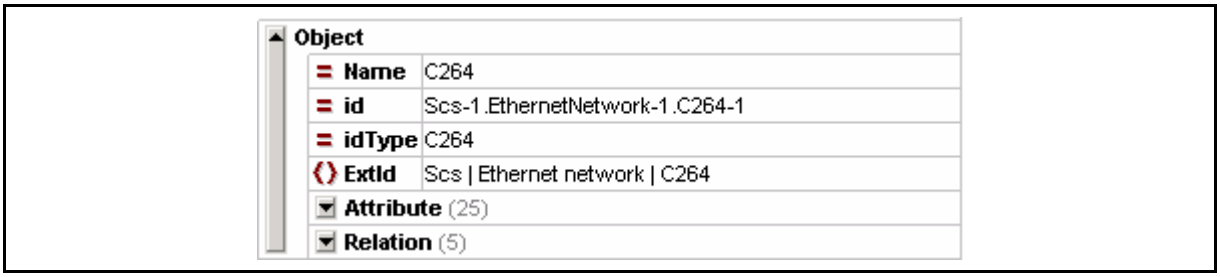
The others **Extra configuration files** attached to data are **included** from any import and export actions:

- XML files of FBD (Fast automation description)
- Image files of FBD (*.png)

4.6.4.1 Tools/ Import & Export schema definition

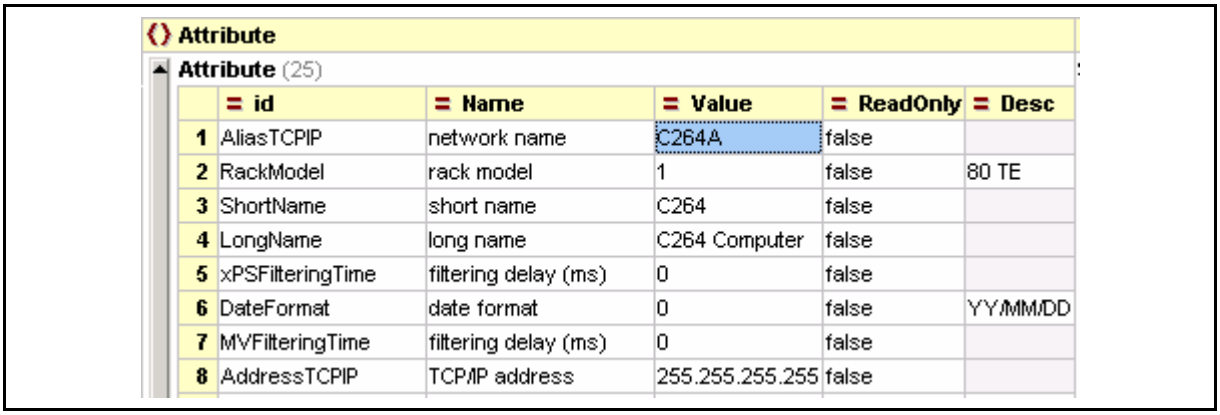
Tools/Import and Tools/Export use the same exchange format.

**Object** is the central XML element of this format:




- **Name** is the PACiS SCE attribute short name of the object,
- **id** is the internal PACiS SCE id of the object;
- **idType** is the type id of the object;
- **ExtId** is the object path name, also called External Id. This path name identifies the object and its parents. It's a concatenation of short name of each parents of the object;
- **Attribute(s)** is a PACiS SCE attribute of the object with:
  - id is the internal mnemonic of the attribute,
  - Name is the label that is used by PACiS SCE Attribute editor,
  - Value is the value of the attribute,
  - ReadOnly is a flag that indicates the attribute is read only or not
  - and eventually Desc is the textual description of an enumerate value.

In the following example, an attribute is displayed in each line, so 8 attributes are displayed:

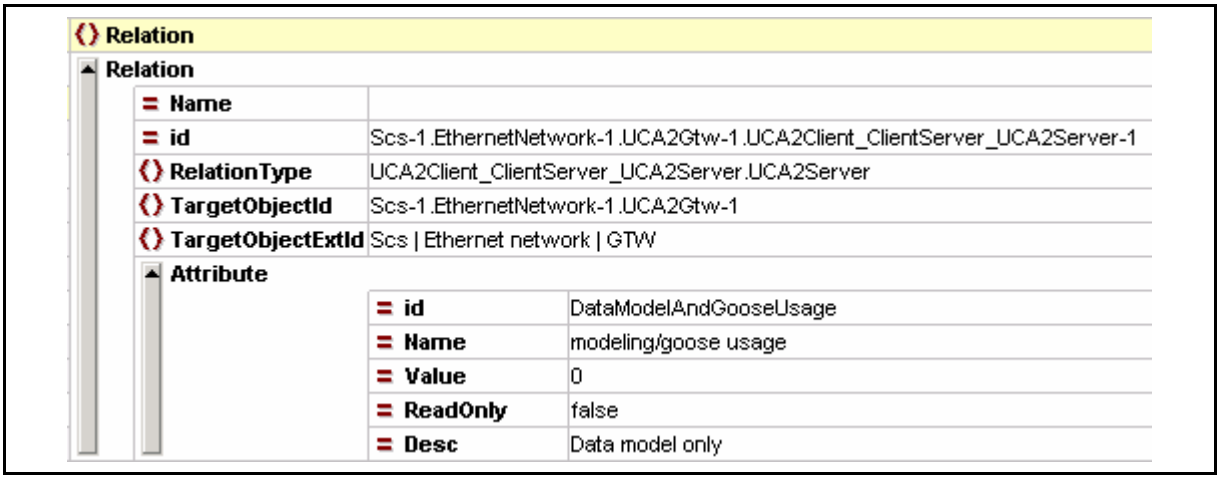

Attribute

Attribute (25)

| | id | Name | Value | ReadOnly | Desc |
|---|---|---|---|---|---|
| 1 | AliasTCPIP | network name | C264A | false | |
| 2 | RackModel | rack model | 1 | false | 80 TE |
| 3 | ShortName | short name | C264 | false | |
| 4 | LongName | long name | C264 Computer | false | |
| 5 | xPSFilteringTime | filtering delay (ms) | 0 | false | |
| 6 | DateFormat | date format | 0 | false | YY/MM/DD |
| 7 | MVFilteringTime | filtering delay (ms) | 0 | false | |
| 8 | AddressTCPIP | TCP/IP address | 255.255.255.255 | false | |

- **Relation(s)** is the definition of a link between this object and another object:
  - this link or relation is typed;
  - the other object is defined by its identifiers (internal and external);
  - and, optionally, relation has its own attribute(s).

  In the following example, the relation describes the link client/server between two devices. This kind of link has an attribute, DataModelAndGooseUsage, which defines the type of SBus communication between theses two devices.




The description of PACiS SCE exchange format is completely defined by schema file (*.xsd) in PACiS SCE installation directory: PACiS SCEx.y/data/dtd/**ExportDb.xsd**

4.6.4.2 Tools/Export…

Purpose:

**Export in XML zipped files** the selected **part of current database**.

The selection of data is made in a browser displaying the three categories of objects (electrical, system and graphical) and templates split in the 3 previous categories, corresponding to the main entry point of the template.

The exported data can be issued from the result of a query.

Standard export **produces multiples XML files**:

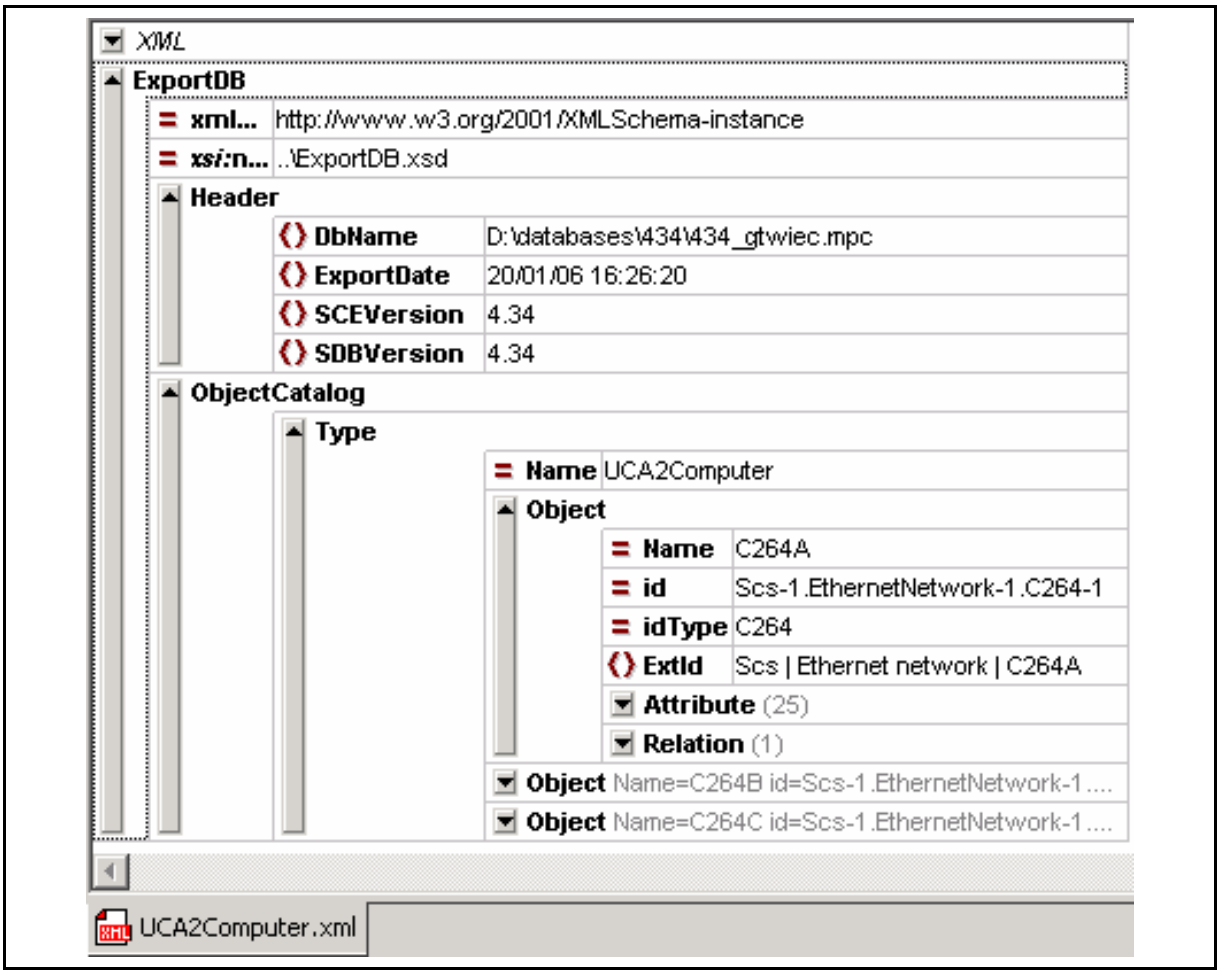
- **One file for each type** of exported objects and one file for each type of exported templates.

  NOTES: - Each XML file uses the **standard PACiS SCE XML format**.

  - One file contains only one type of objects.

  - Two sub-directories are exported, one contains all objects files, and the other all templates files.

In the following example, the file UCA2Computer.xml contains three computers. A header element defines the context of this export.




- The **Extra configuration files**: for the FBD objects or templates, a sub-directory (Fbd) is exported and it contains all XML files image files of FBD.

Standard export produces also some files used only for **reporting use cases**. Theses files are not used by import use cases.

- **Hierarchy.xml**: XML file containing all the object/template hierarchy exported.
- **Catalog.xml:** XML file containing the list of files exported for each object/template types.
- **ExportDB.xsd**: schema of exported XML files. Only for info.

Availability:

- Right dependent

Other call:

- None

Operation:

1. Select Tools/Export item
2. A browser appears. Select the part of work database to export.

FIGURE 178 - TOOLS/EXPORT SELECTION

3. Click the **Export** button.
4. A window pop-up to define directory and name of zip file
5. The exported files are stored in this ZIP file.

4.6.4.3 Tools/ Import…

Purpose:

**Import XML files**. The following actions are taken into account during this import:

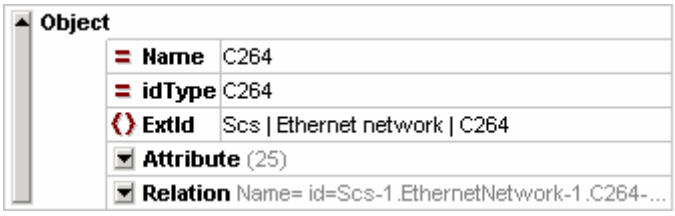
- object attributes and relations modifications,
- object creations,
- object instantiation from template,
- object deletions.

Standard import is available for one XML file or for ZIP file that contains several XML files. In this case, the XML files are imported with file name alphabetic order.

In a XML file, only **Object elements** are taken into account during import process, with file reading/parsing order. The XML element Type which could group objects with the same type is not taken into account. The Object elements that represent **PACiS SCE template are not imported**.

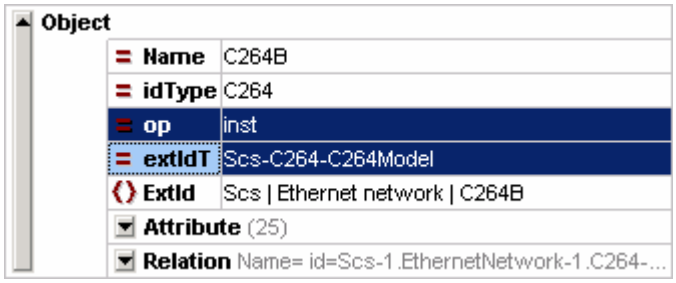
Import format is the standard **PACiS SCE XML format**. So, the complete XML description (attributes, relations) of a PACiS SCE object, is the result of the Standard export use case.

**By default**, Object is imported in **creation/updating** mode: if the object already exists, it is updated, otherwise it is created.

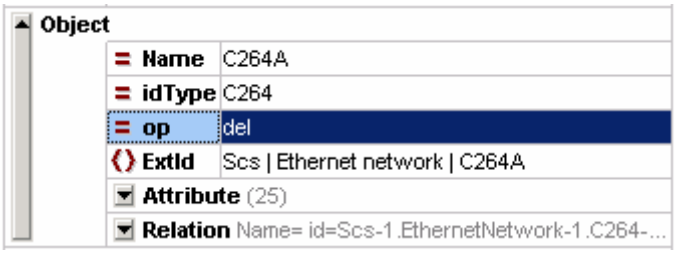



Some **other explicit actions** are available during import:

- **instantiate** a template. An attribute op with key word “inst” as value is defined. Another attribute extIdT contains the identifier of template to instantiate.




- **delete** an object. An attribute op with key word “del” as value is defined. It indicates that object must be deleted.




Remark 1:

XML Attribute Name is optional. It is used to modify the PACiS SCE attribute Shortname of the object. If XML Attribute Name is not defined, ExtId must be defined; the last part of ExtId is used instead of XML Attribute Name.

Remark 2:

XML Attribute id and sub-element ExtId are both optional, but one at least must be defined to identify the object during import into database. To search the object in database, XML Attribute Id is used at first. If Id is not defined, ExtId sub-element is used. When ExtId is used, if two objects at the same hierarchical level have the same external Id, an extra discrimination is done based on its idType. This idType is used to determine the basic class of the object. The external Id + this determined class must define a unique key.

Remark 3: (relative to Extra Configuration files of FBD)

In the sub-directory Fbd, the XML files of FBD are imported **only** if the corresponding diagram exists in database. Each XML file of FBD has a "FBType" element with the "ExtId" attribute that is the external Id of its corresponding diagram in order to find it.

Availability:

- Right dependent

Other call:

- None

Operation:

1. Select **Tools/Import** item
2. A file chooser appears. Select one or more xml files or archive files. The import treatment is then applied on all selected files.

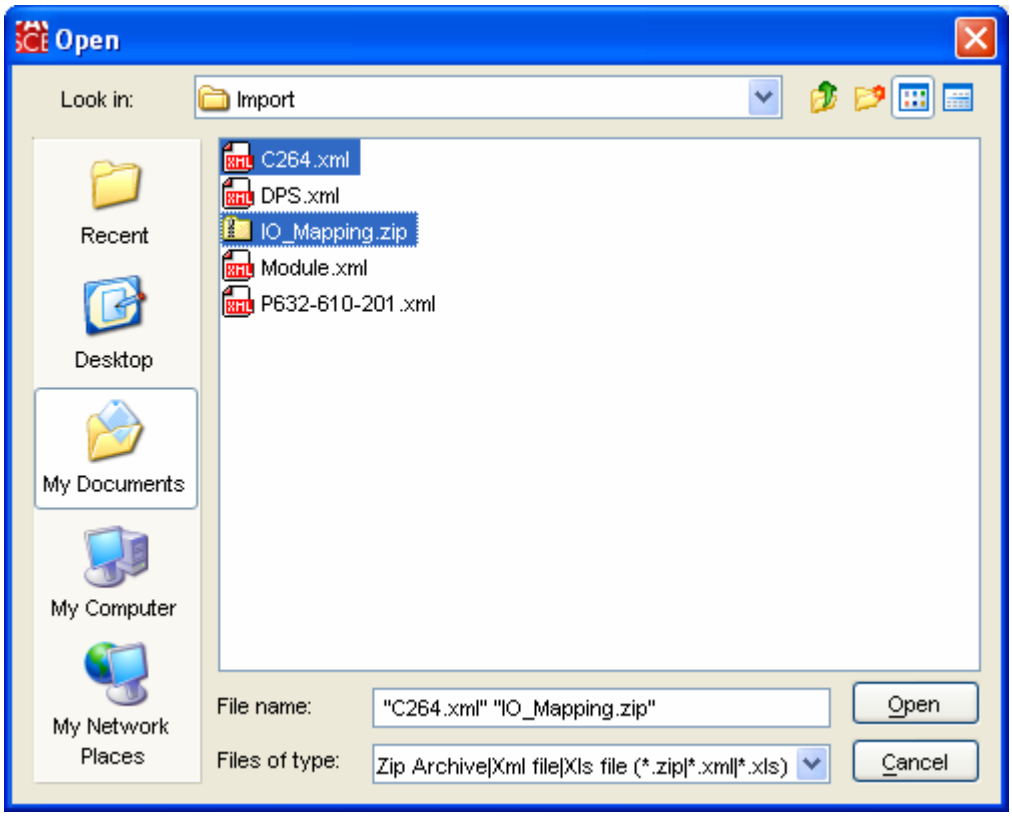



FIGURE 179: TOOL/IMPORT FILE CHOOSER

4.6.5 Tools/Report…

Purpose:

- Creation of a **report from an archive file** created by Tools/Query or Tools/Export function. The **format** of the report is *.**pdf**.

Availability:

- Right dependent

Other call:

- None

Operation:

1. Select **Tools/Report…** item. A file chooser appears.

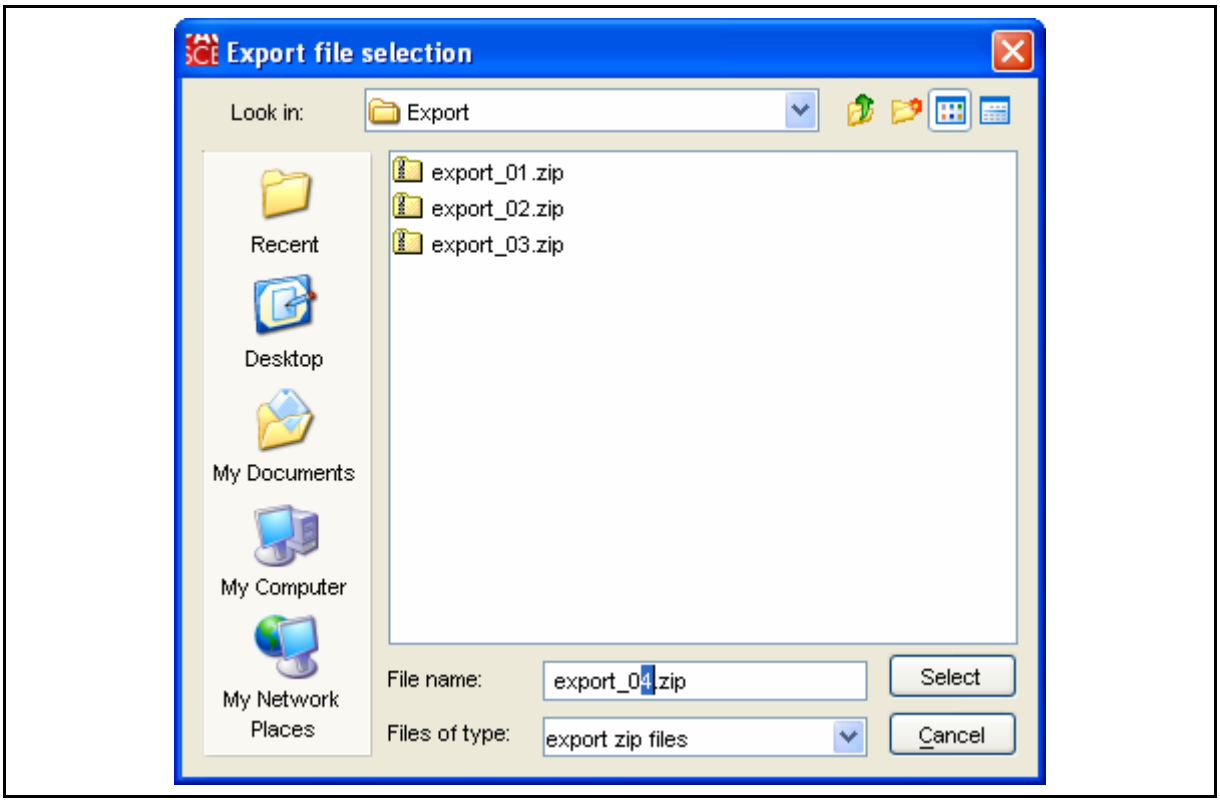



FIGURE 180: TOOL/REPORT ARCHIVE FILE SELECTION

2. Choose an archive that has been created by a previous Tools/Export action.
3. A pdf report document is then displayed with a pdf reader. A pdf file is created in the same directory than the selected archive with the same name. This report contains a full description of all data of the selected archive.

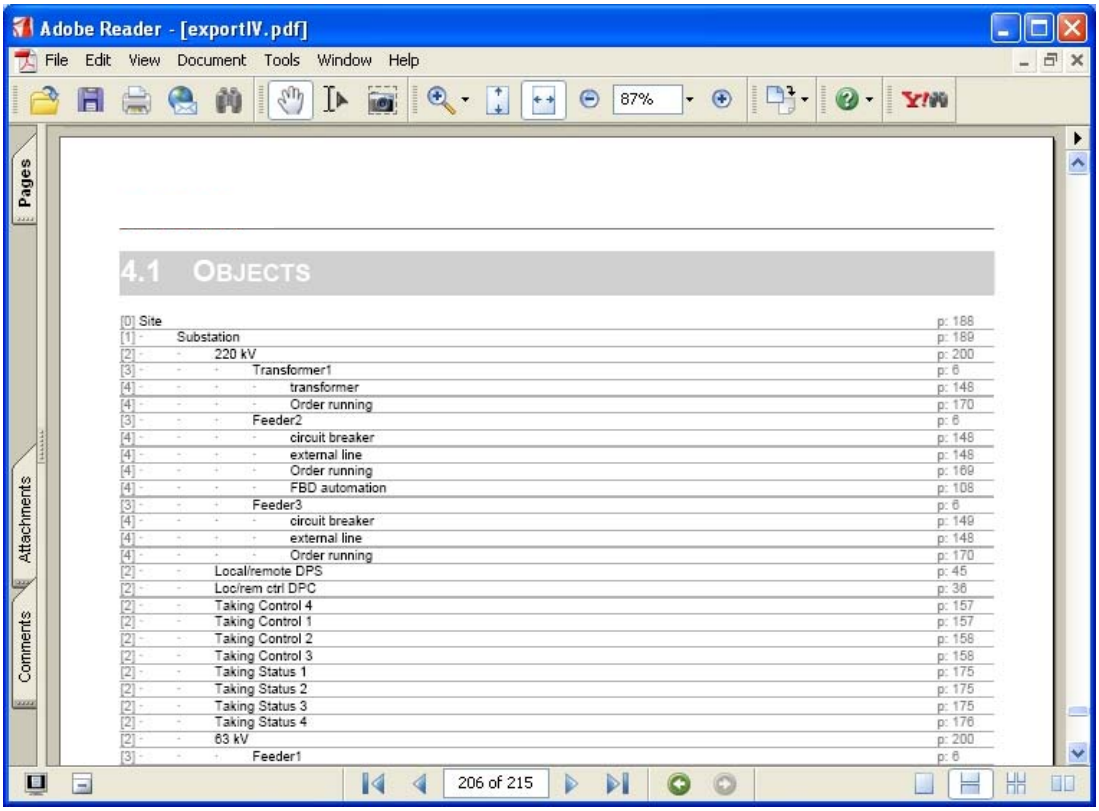
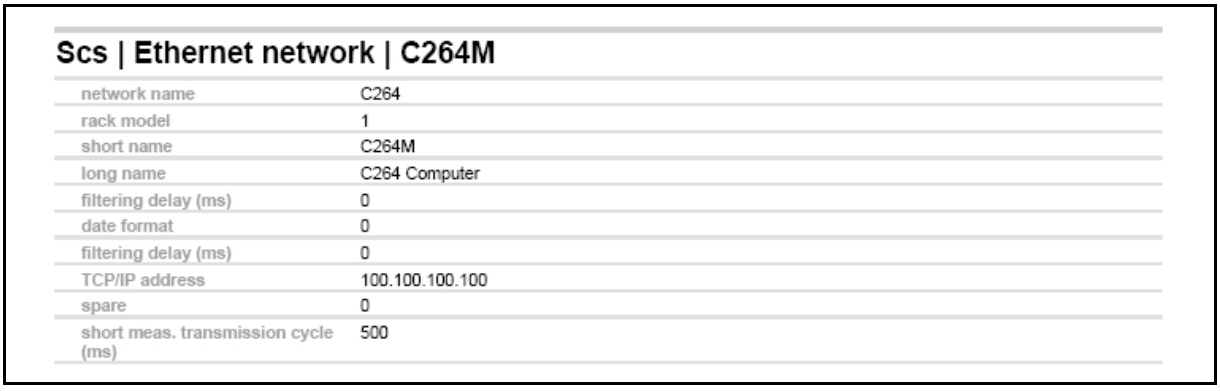

Adobe Reader - [exportIV.pdf]
File Edit View Document Tools Window Help
87%
Pages
Attachments
Comments
4.1 OBJECTS
[0] Site p: 188
[1] Substation p: 189
[2] 220 kV p: 200
[3] Transformer1 p: 6
[4] transformer p: 148
[4] Order running p: 170
[3] Feeder2 p: 6
[4] circuit breaker p: 148
[4] external line p: 148
[4] Order running p: 169
[4] FBD automation p: 108
[3] Feeder3 p: 6
[4] circuit breaker p: 149
[4] external line p: 148
[4] Order running p: 170
[2] Local/remote DPS p: 45
[2] Loc/rem ctrl DPC p: 36
[2] Taking Control 4 p: 157
[2] Taking Control 1 p: 157
[2] Taking Control 2 p: 158
[2] Taking Control 3 p: 158
[2] Taking Status 1 p: 175
[2] Taking Status 2 p: 175
[2] Taking Status 3 p: 175
[2] Taking Status 4 p: 176
[2] 63 kV p: 200
[3] Feeder1 p: 6
206 of 215

FIGURE 181 - TOOL/REPORT PDF FILE RESULT



**Scs | Ethernet network | C264M**

| | |
|---|---|
| network name | C264 |
| rack model | 1 |
| short name | C264M |
| long name | C264 Computer |
| filtering delay (ms) | 0 |
| date format | 0 |
| filtering delay (ms) | 0 |
| TCP/IP address | 100.100.100.100 |
| spare | 0 |
| short meas. transmission cycle (ms) | 500 |

FIGURE 182 - TOOL/REPORT OBJECT DESCRIPTION FORMAT

### 4.6.6 Tools/Export FBD

Purpose:

- Export in XML format FBD automations or FBD interlocks.

  The exported files are stored in a ZIP file which can contain in according to the choise of the user:

  - One XML file per FBD describing the FBD plus one XSD file describing the schema of a FBD XML file. The XML file is linked to an XSD schema: therefore it must be valid. This file is used after updating by the FBD Editor (The EqViewer software); It contains:
    - the general data
    - the interface data (inputs, outputs)
    - the Function Block data (type, location)
    - the connection data (source, destination)

- One PNG file per FBD which is the graphical representation of the FBD. Even if the FBD has been created on 2 or 4 pages in the FBD Editor, only one PNG file is generated. The image size depends on the useful area of FBD.
- One PDF file which is a report of all selected FBD in the dialog box. It is generated in A4 format with the landscape orientation. It contains
  - a cover page (see figure 186)
  - a blank page
  - the FBD list ( see figure 187)

  For each FBD
  - the diagram picture ( see figure 188)
  - the input list ( see figure 189)
  - the output list ( see figure 190)

Availability:

•

Other call:

- None

Operation:

- Export of FBD can be done by two ways: One by one and globally

  NOTE: The following explanations concern a FBD automation but are valid too for a FBD interlock

- Export one by one:

  1. Right-click the FBD to export. Then in the contextual menu click **Export FBD…**.

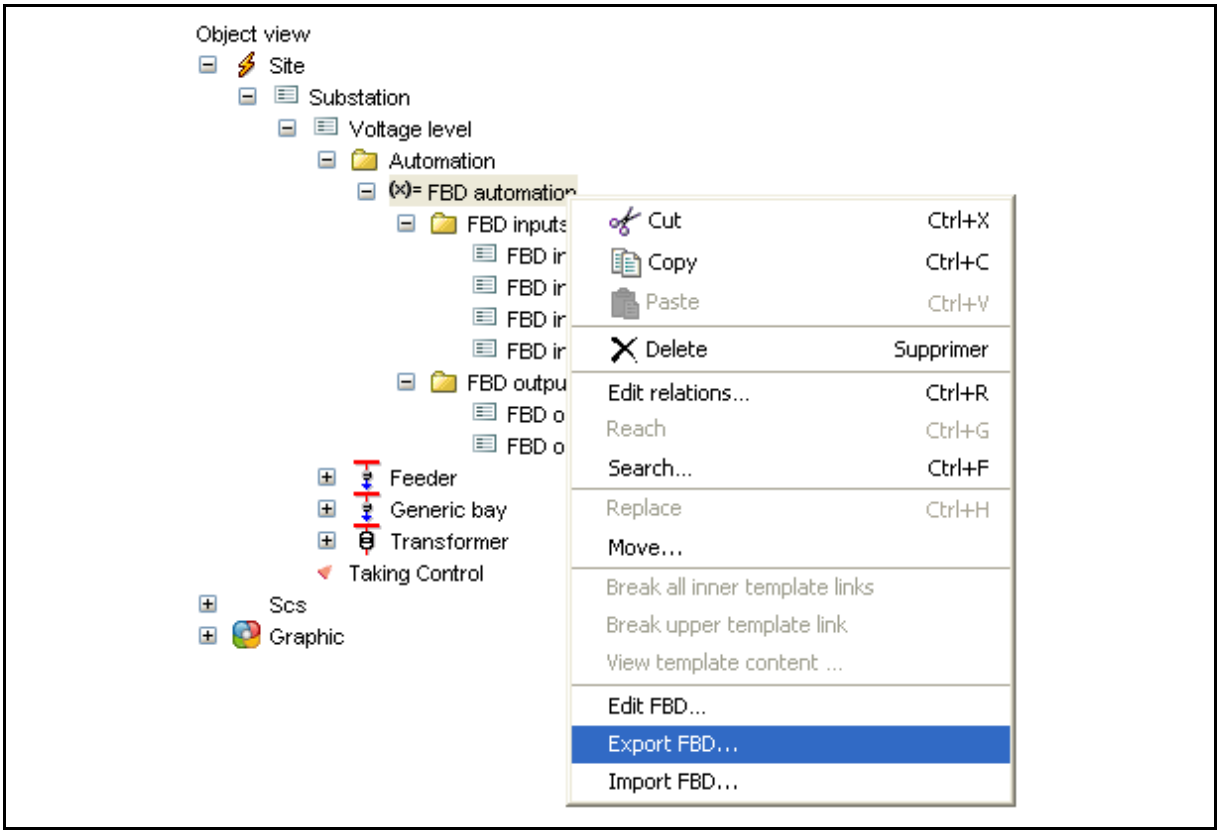



FIGURE 183: SELECTION OF THE FBD TO EXPORT

  2. A **Save** dialog box is displayed in order to choose the destination folder and the filename ( extension **xml**). When done click the **Save** button.

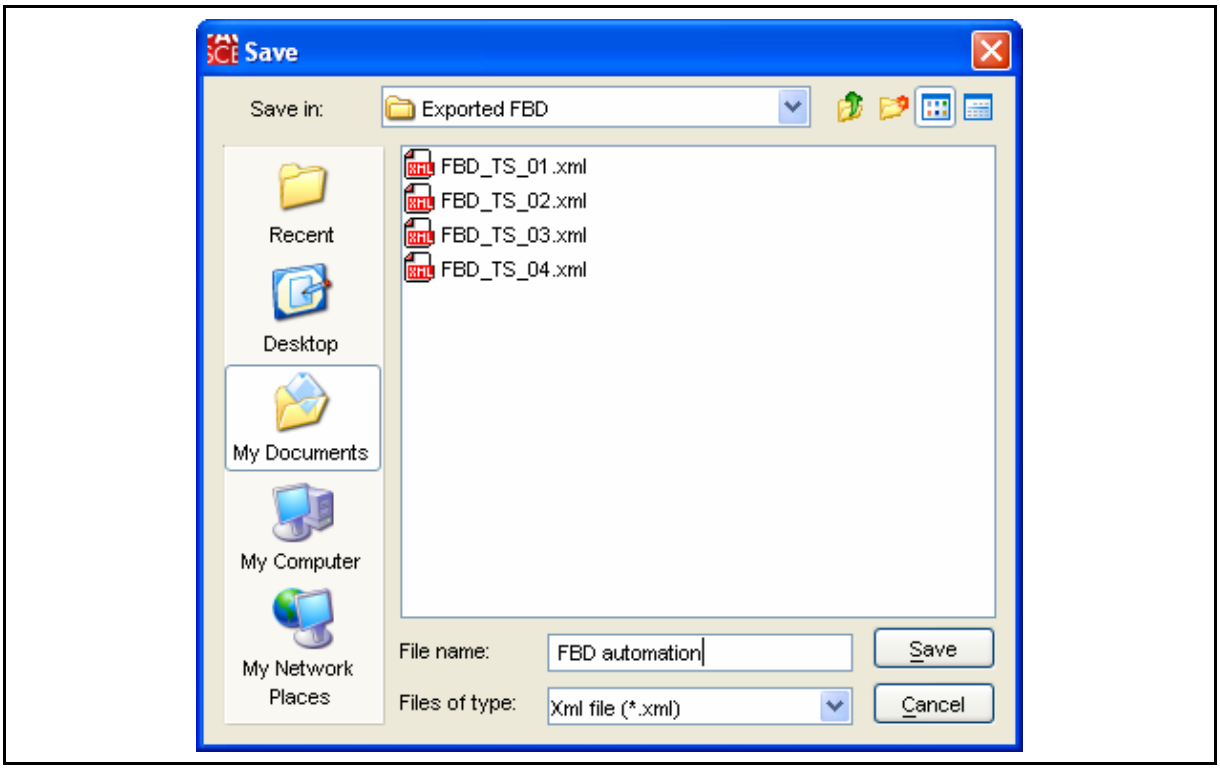



FIGURE 184: SELECTION OF THE DESTINATION FOLDER AND THE FILENAME

- Export globally:

1. Click **Tools/Export** item: the **FBD Export** dialog box is then displayed
2. Select the check box of the FBD to export
3. Select the output file format ( XML, PNG, PDF)
4. Click the **Run** button.

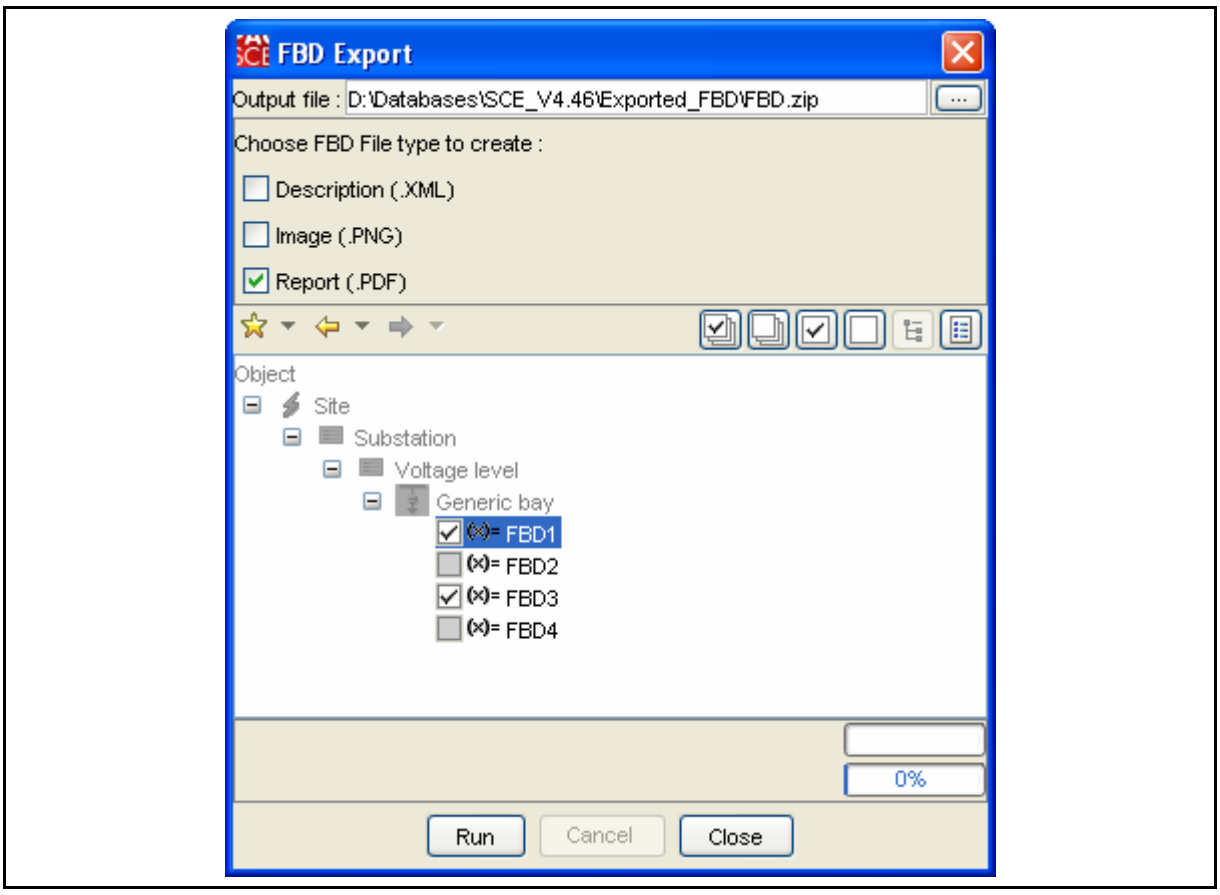



FIGURE 185: GLOBAL FBD EXPORT DIALOG BOX

5. A **Save** dialog box is displayed in order to choose the destination folder and the filename ( extension **zip**). When done click the **Save** button. A popup window informs that the export is running.

The followings figures give an example of some pages of the pdf file generated by the FBD Export function:

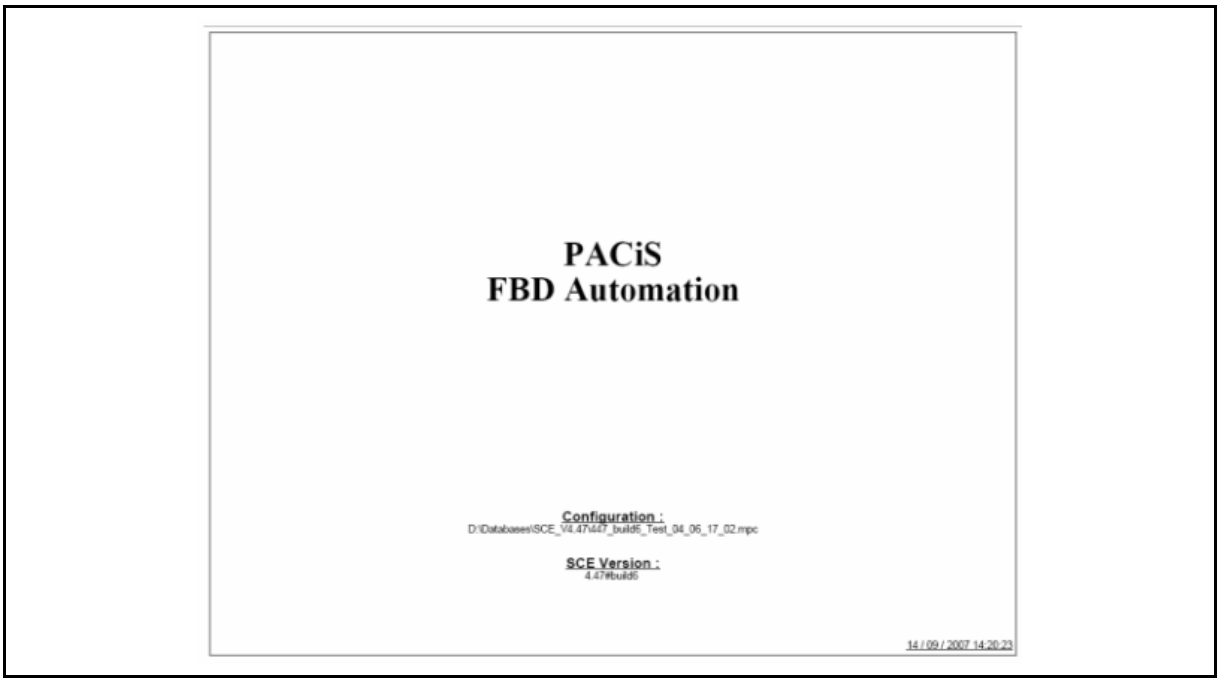



FIGURE 186: THE COVER PAGE OF THE FBD AUTOMATION REPORT

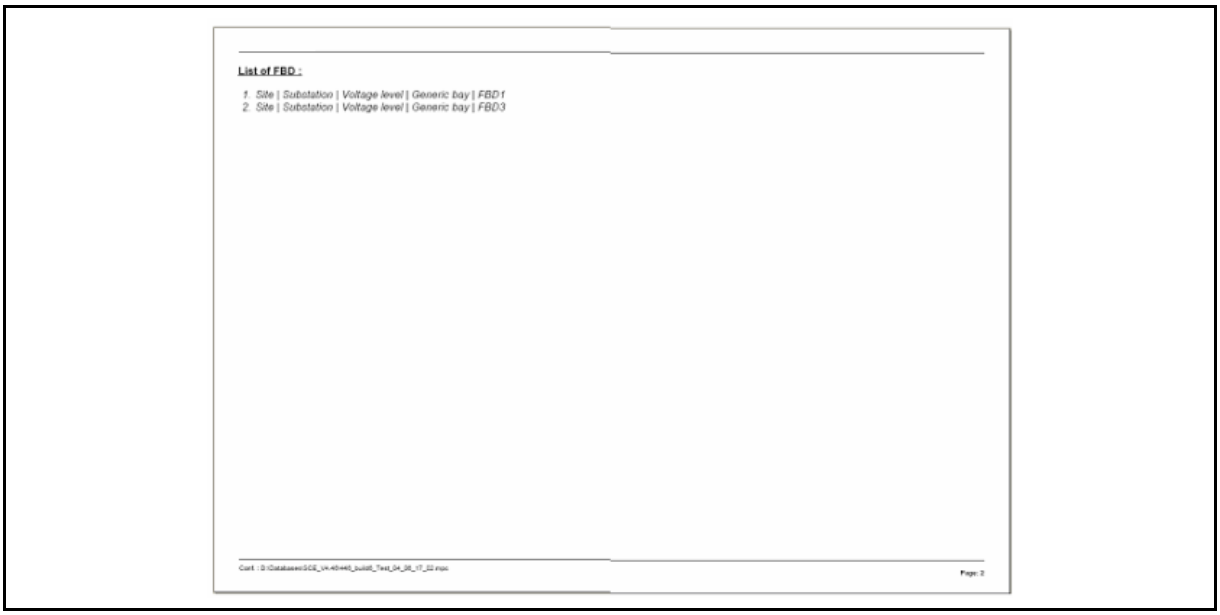



FIGURE 187: THE LIST OF EXPORTED FBD

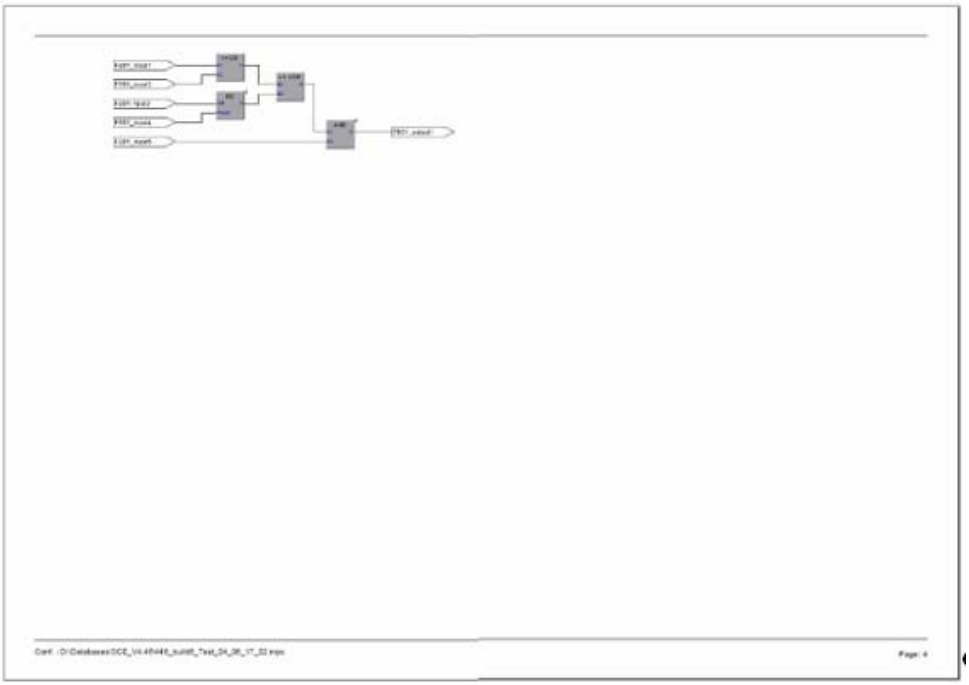
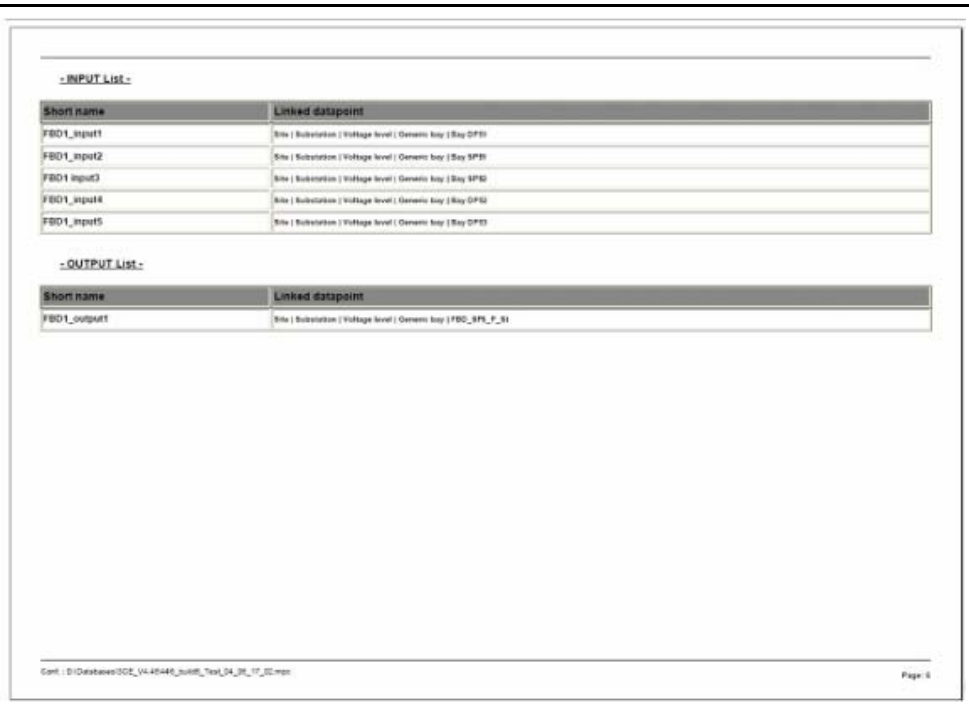


FIGURE 188: THE DIAGRAM OF FBD1



- INPUT List -

| Short name | Linked datapoint |
|---|---|
| FBD1_input1 | |
| FBD1_input2 | |
| FBD1 input3 | |
| FBD1_input4 | |
| FBD1_input5 | |

- OUTPUT List -

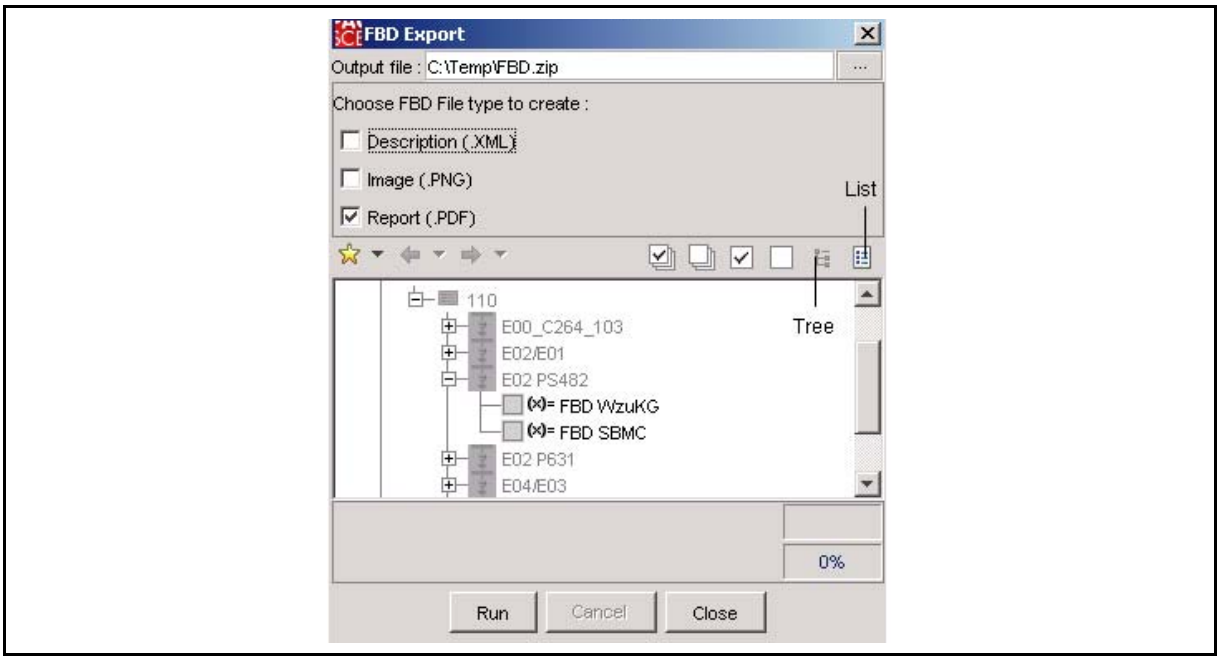
| Short name | Linked datapoint |
|---|---|
| FBD1_output1 | |

FIGURE 189: THE INPUTS AND OUTPUTS LISTS OF FBD1

- Export to file:

The user can access to this function by clicking in tools\Export FBD menu.

A dialog box presents all FBD available on database and allows selecting all or part of them. The spare and template objects are not available.




The user has to define the output file, the FBD type to create (XML, MNG or PDF file) and also has to select which FBD he wants to export. The display of FBD can be based on Tree mode or List mode

4.6.7 Tools/Import FBD

Purpose:

- Import in XML format FBD automations or FBD interlocks.

Availability:

- A FBD ( automation or interlock) is present in the working database

Other call:

- None

Operation:

- Import of FBD can be done by two ways: One by one and globally.

  Note: The following explanations concern a FBD automation but are valid too for a FBD interlock

  - Import one by one:

    1. Add a FBD automation to the selected level ( in the example given hereafter the selected level is **Feeder**). This is done via the **"Object entry"** area associated to the selected level ( **Feeder** in our example) by expanding **User function** then double-clicking **FBD automation** ( or right-clicking it and then clicking **Add**)

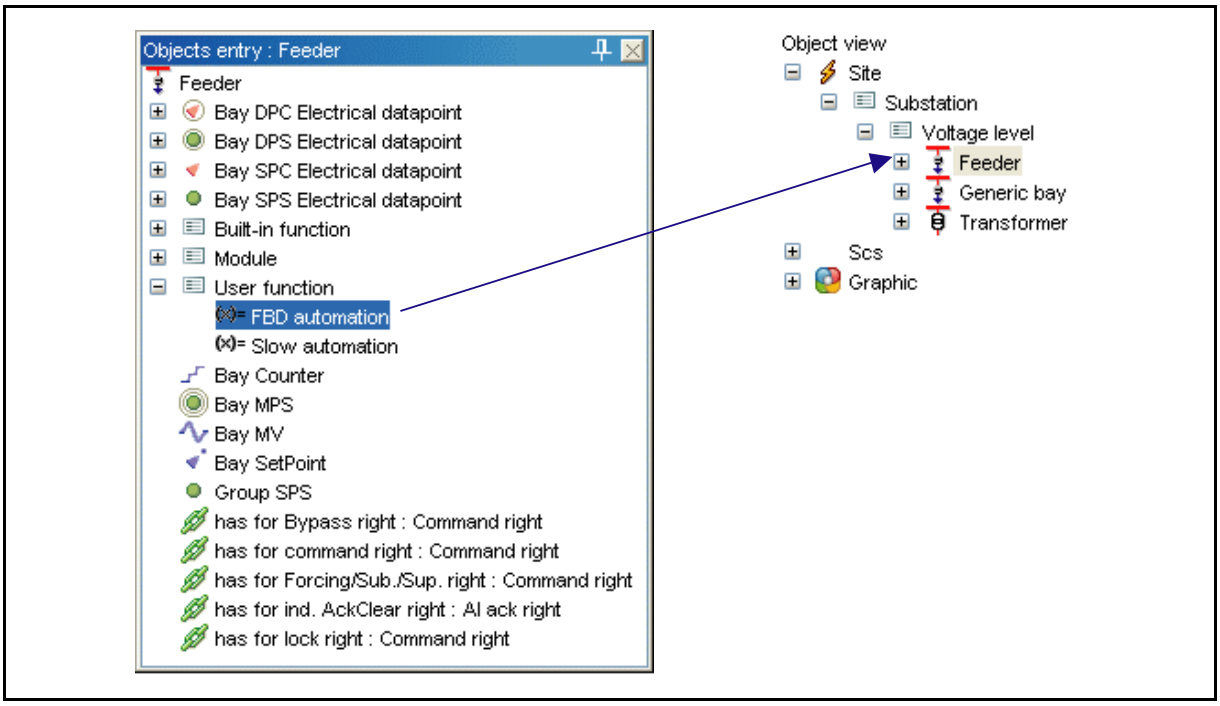



FIGURE 190: ADDING A FBD AUTOMATION TO A FEEDER

2. Right-click the newly created FBD. Then in the contextual menu click **Import FBD…**.

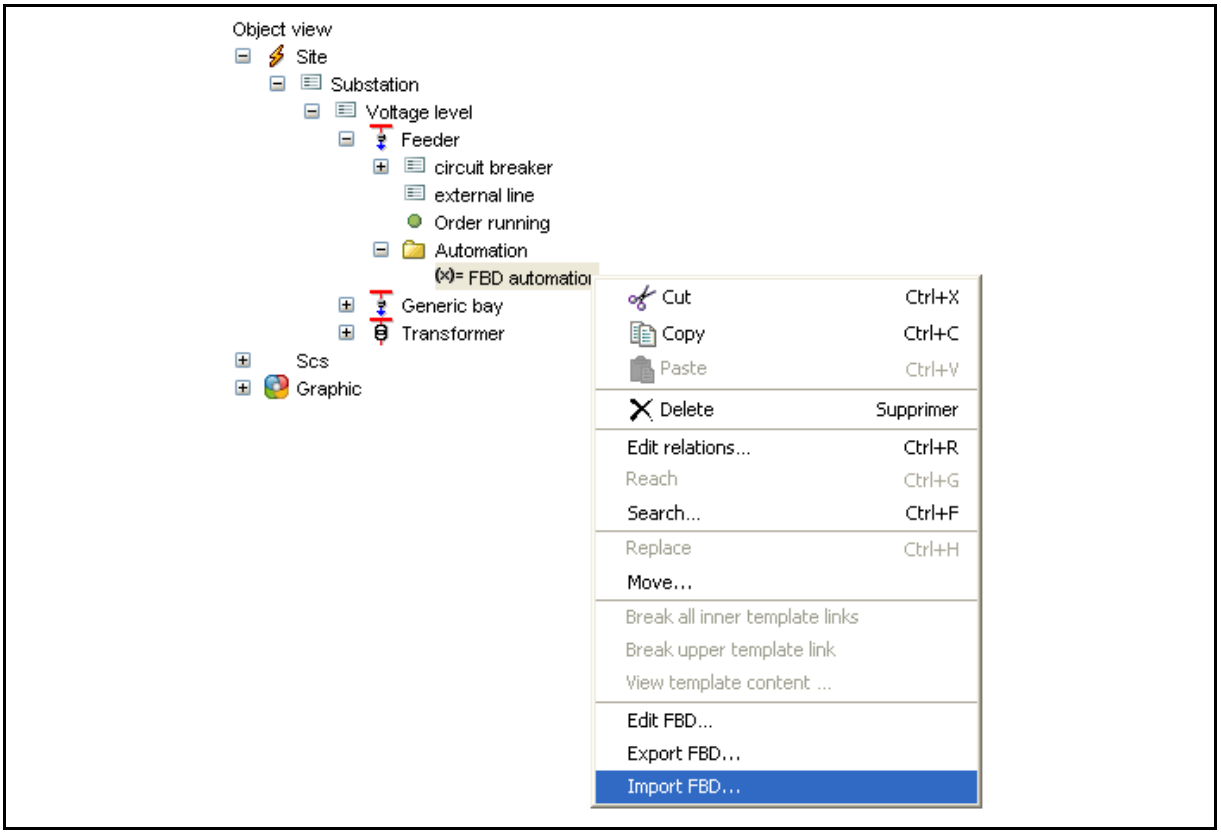



FIGURE 191: SELECTION OF THE FBD TO IMPORT

3. An **Open** dialog box is then displayed in order to choose the origin folder and the name of the xml file to import ( **FBD_TS_03.xml** in our example). When done click the **Open** button.

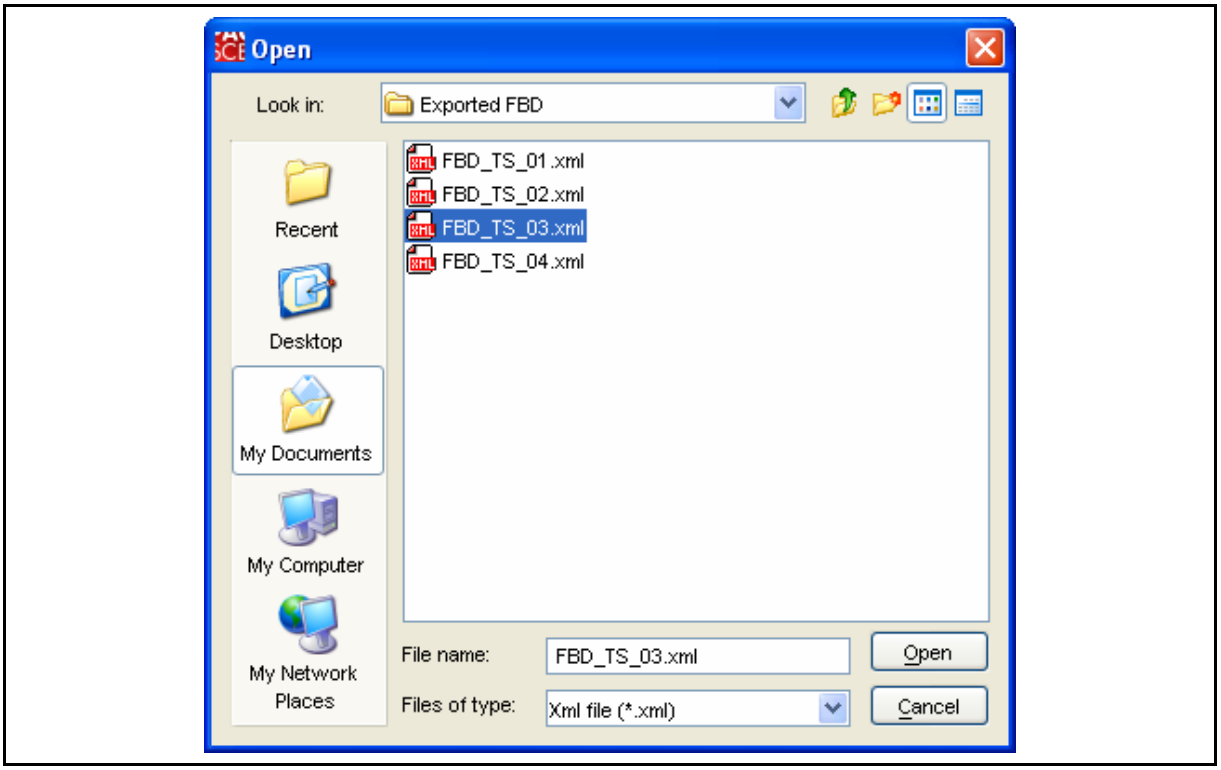



FIGURE 192: SELECTION OF THE XML FILE TO IMPORT

4. The FBD automation is then present at the **Feeder** level.

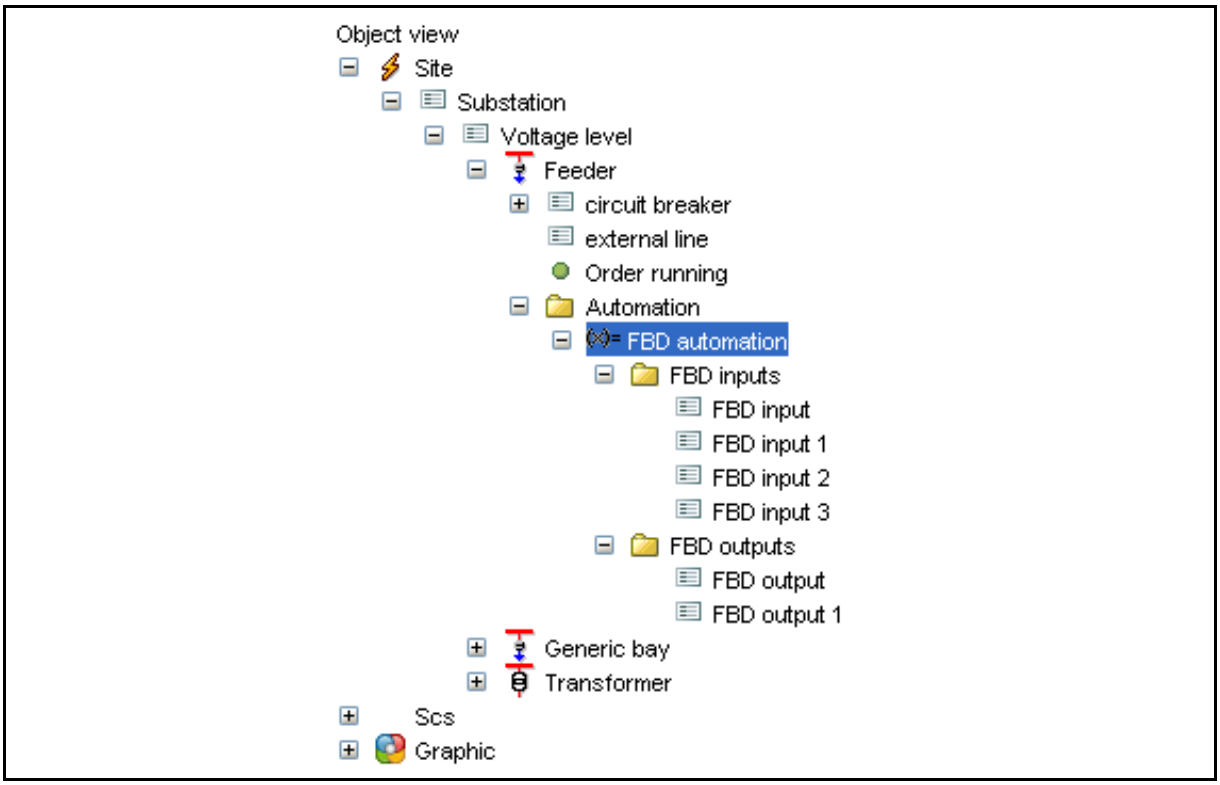



FIGURE 193: THE IMPORTED FBD AUTOMATION

- Import globally:

1. Click **Tools/Import** item
2. An **Open** dialog box is then displayed in order to choose the origin folder and the name of the zip file to import ( **Two_FBD.zip** in our example. This file has been previously created with the Tools/Export function and contains two FBD: FBD 1 and FBD 2). When done click the **Open** button.
3. FBD 1 and FBD 2 are present at the feeder level

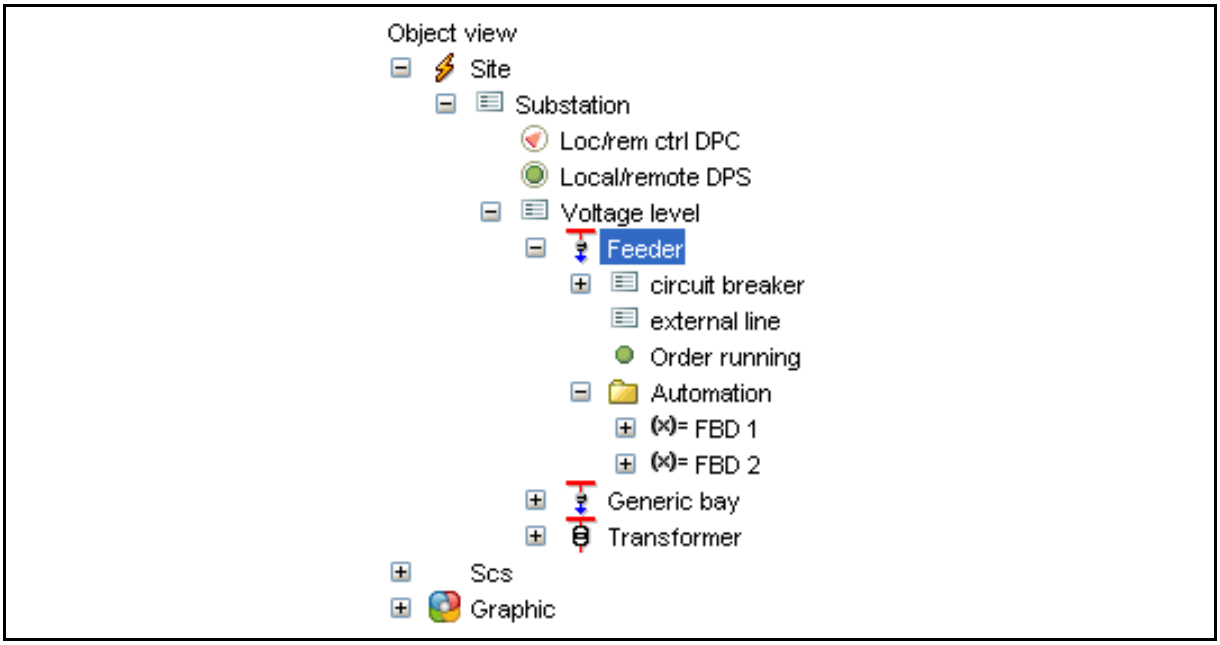



FIGURE 194: THE GLOBALLY FBD IMPORT FUNCTION

4.6.8 Tools/Export IOMapping…

Purpose:

- This export is a specialization of standard export: it allows to **export the IO mapping of C264 devices**.

It uses the same XML schema but the exported files and the data selection are different.

The exported files are stored in a ZIP file.

IO Mapping Export produces multiple XML files:

- **1 file** for **all profiles** named <1 – Profiles.xml>,
- **1 file** for **all selected C264**, named <2 – Equipement.xml>,
- **n files**, one for **each selected C264**, named <3 – computer's short name.xml>.

Each XML file respects the standard PACiS SCE XML format and hierarchy.

**Profiles:**

This file is build with all profiles found directly under Scs root and which respect the pattern *_[n].

**Equipment:**

This file is built with all equipment of the database (even if not selected in dialog box) and describes each one:

- for a C264, it gives all cards, SCADA networks, Legacy networks (IED) and printers,
- for a Gateway, it gives all SCADA networks,
- and for OI, it gives all printers.

**Computer(s):**

The last files are built for each selected C264 and define all datapoints managed by this computer and their addresses (linking + SCADA + IED). They contain the following information:

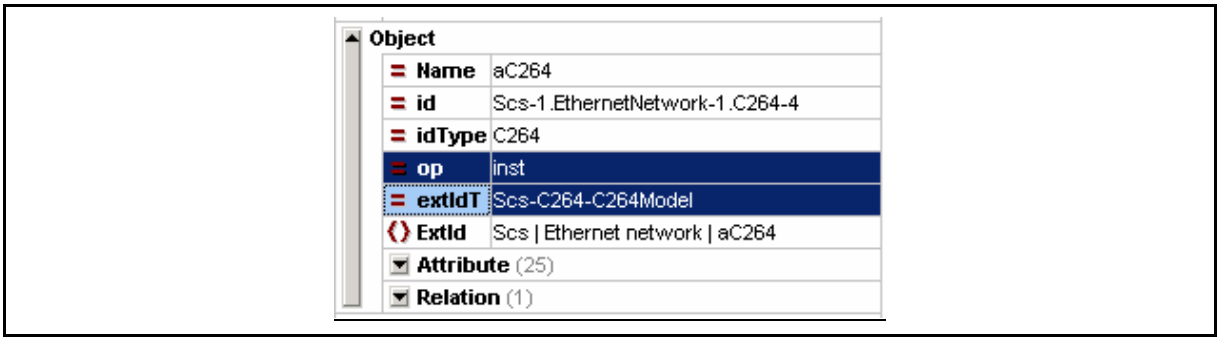
- SCADA address (of other devices or of the computer) used by datapoints managed by the computer,
- IED address of the computer,
- Voltage Level,
- datapoints on Voltage Level,
- Bays managed by computer,
- datapoints on Bays level,
- Modules,
- datapoints on Modules level

Remark 1:

In each file, the objects are sorted by their external id (= ExtId = path of short names of the hierarchy of the object).

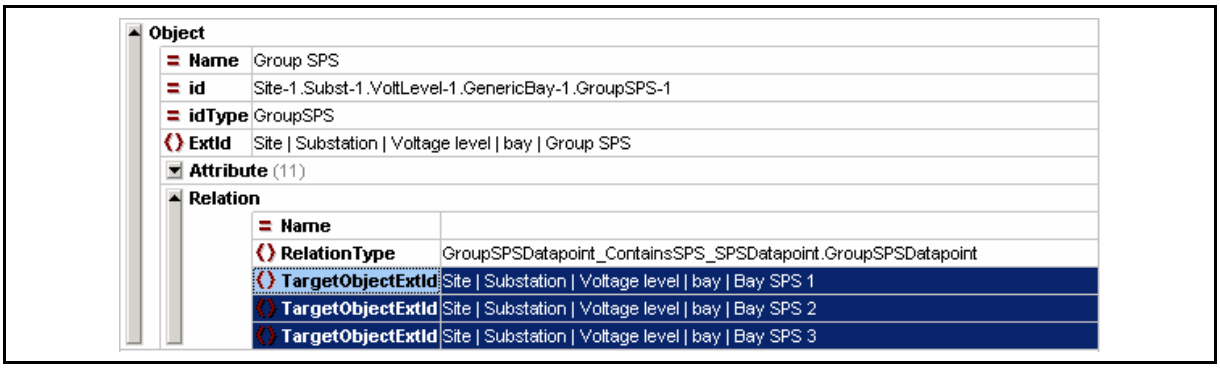
Remark 2:

If an object is an instance of a Template and is the main object, XML attributes **op** and **extIdT** are added: **op** with “inst” as value and **extIdT** with external id of template to instantiate as value. The external id of a template is the name of template that is displayed in template navigator. For example, if a C264 is an instance of template Scs-C264-C264 Model:




Remark 3:

The relations are factorized. For example, an object “Group SPS” has several relations with other SPS; each one uses the same type of relation. In this case, only one XML element Relation contains all sub-element TargetObjectExtId. Each TargetObjectExtId sub-element defines the external identifier of each linked object.


Object
Name Group SPS
id Site-1.Subst-1.VoltLevel-1.GenericBay-1.GroupSPS-1
idType GroupSPS
ExtId Site | Substation | Voltage level | bay | Group SPS
Attribute (11)
Relation
Name
RelationType GroupSPSDatapoint_ContainsSPS_SPSDatapoint.GroupSPSDatapoint
TargetObjectExtId Site | Substation | Voltage level | bay | Bay SPS 1
TargetObjectExtId Site | Substation | Voltage level | bay | Bay SPS 2
TargetObjectExtId Site | Substation | Voltage level | bay | Bay SPS 3

Availability:

- Right dependent

Other call:

- None

Operation:

1. Select **Tools/Export IOMapping** item
2. A dialog box presents all computers available on database and allows to select a part or all of them. The spare and templates objects are not available.
3. Select the C264 devices to export. Two representations (tree or list) are available. Shortcuts could be used for selection.

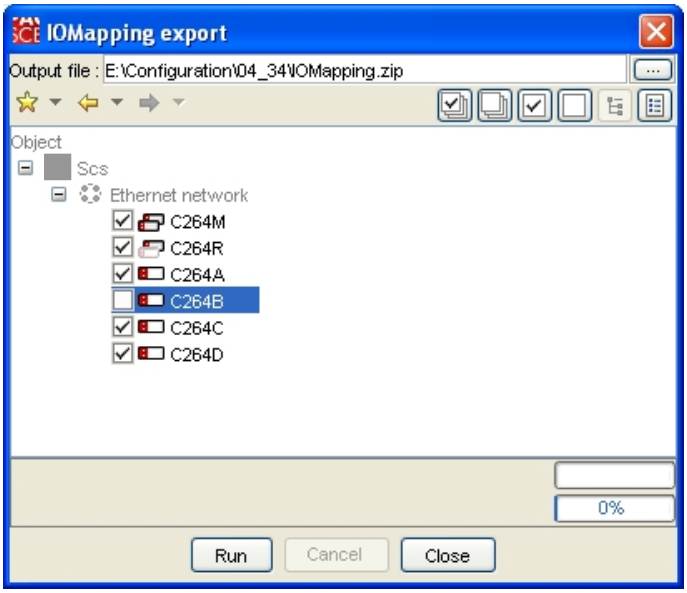



FIGURE 195 - TOOLS/EXPORT IOMAPPING SELECTION

4. Select the output file by clicking the "**...**" button
5. Click the **Run** button
6. The action progression is displayed graphically. This progression can be followed in three ways:
   - the progress bar is animated to display the percentage of achievement of the process (the value is a ratio of number of treated items),
   - the messages displayed on status bar which are specific of each using,
   - the nodes of the browser change in function of their processing state to follow processing.

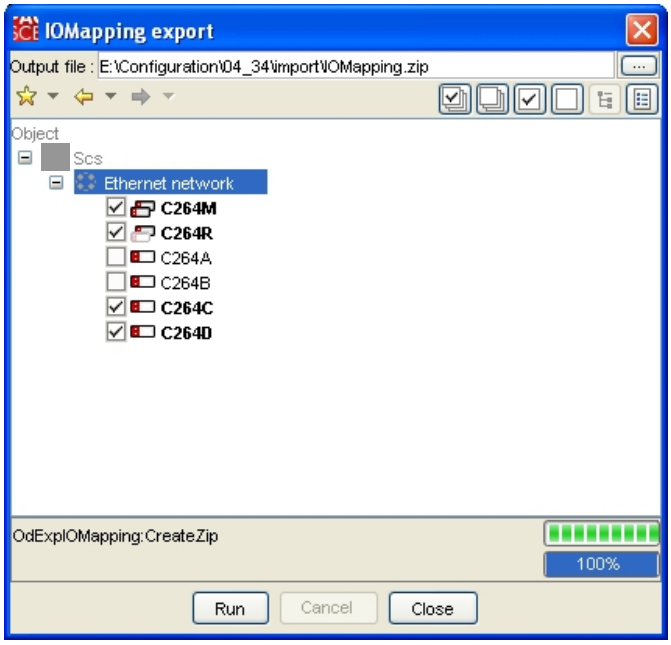



FIGURE 196 - TOOLS/EXPORT IOMAPPING RUNNING

7. The Export action could be cancelled at any moment.
8. The exported files are stored in the given ZIP file.

### 4.6.9 Tools/Export Wiring

Purpose:

- Export the wiring information of the selected computer(s)

Availability:

- A database is open

Other call:

- None

Operation:

1 Select **Tools/Export Wiring** item: the **Wiring Export** dialog box is then displayed.

2 Select the output file, its format (XML or PDF) and the computer(s) whose wiring is (are) to be exported.

3 Click the **Run** button

A dialog box presents all Computers available and allows selecting all or part of them. The spare and template objects are not available

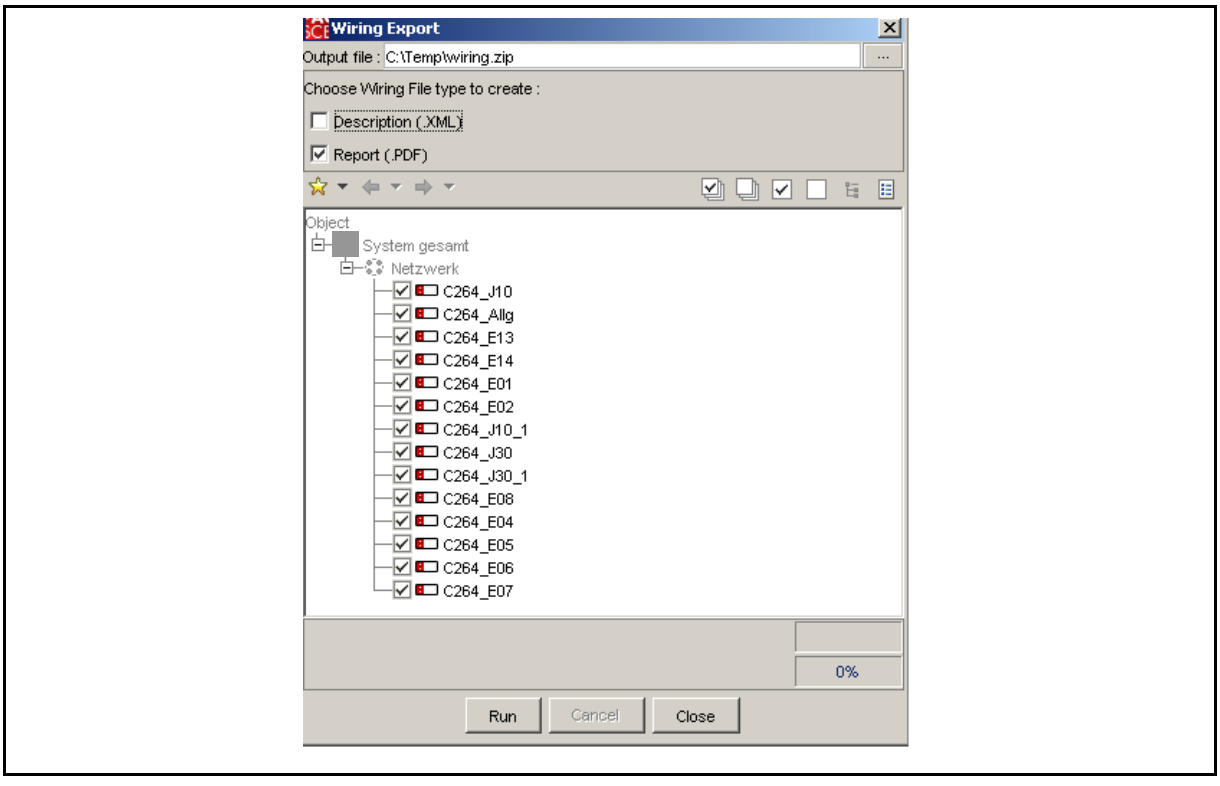



FIGURE 197: - TOOLS/EXPORT WIRING SELECTION

The action progression is displayed graphically. This progression can be followed in three ways:

- the progress bar is animated to display the percentage of achievement of the process (the value is a ratio of number of treated items),
- the messages displayed on status bar which are specific of each using,
- the look of the selected nodes of the browser change according to their processing state

The user has to define the output file to be created (XML PDF file) and also has to select which Computer he wants to export. The display of Computers can be based on Tree mode or on List mode.

When this export operation is complete the related files are created and can be opened. The "pdf" file is generated in A3 format with the "landscape" orientation. it contains:

- a cover page: title, name of the database, SCE version number, date and time of the file
- a blank page
- the list of the computers
- for each computer: composition of the rack and for each board the name of each datapoint wired to an pin of the connector of the board.

### 4.6.10 Tools/Export SCADA

Purpose:

- Export in standard **SCE) XML format** the information related to the selected SCADA protocol(s)

Availability:

- A database is open

Other call:

- None

Operation:

1 Select **Tools/Export Scada** item: the **Scada Export** dialog box is then displayed.

2 Select the output file and the SCADA protocol(s) which is (are) to be exported.

3 Click the **Run** button

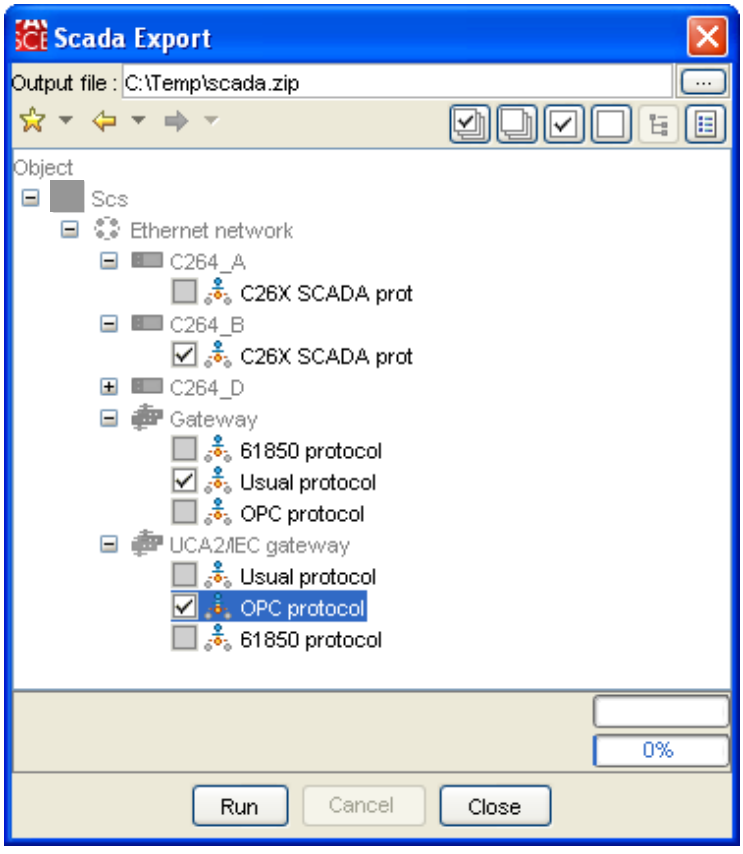



FIGURE 198: - TOOLS/EXPORT SCADA SELECTION

The action progression is displayed graphically. This progression can be followed in three ways:

- the progress bar is animated to display the percentage of achievement of the process (the value is a ratio of number of treated items),
- the messages displayed on status bar which are specific of each using,
- the look of the selected nodes of the browser change according to their processing state

4.6.11 Tools/Export IEC61850 SCL

Purpose:

This export is used to export a database (electric and system topology) in one or several XML files with a schema defined by **IEC 61850** norm:

- electric topology: electro-technical view of the substation with links between different modules (topology),
- system topology: devices definitions and their IEC61850 mapping.

Three export modes are available:

- a complete export (.**SCD**, System Configuration Description), that contains all information of the configured system, only one XML file;
- an IEC61850 IED export (.**CID**, Configured IED Description), that contains all information from an IED, one XML file by IED;
- an IEC61850 IED Model export (.**ICD**, IED Capability Description), that contains an IED template to create IED based on same model; one XML file by IED.

The XML format is described in IEC61850 norm part 6.

The exported files are stored in a ZIP file.

Availability:

- Right dependent

Other call:

- None

Operation:

1. Select **Tools/Export IEC61850 SCL** item
2. A dialog box displays all IEC61850 devices, except OI Server and GTW devices. It allows to select a part or all of them. The spare and templates objects are not available.
3. Select the devices to export. Two representations (tree or list) are available. Shortcuts could be used for selection.

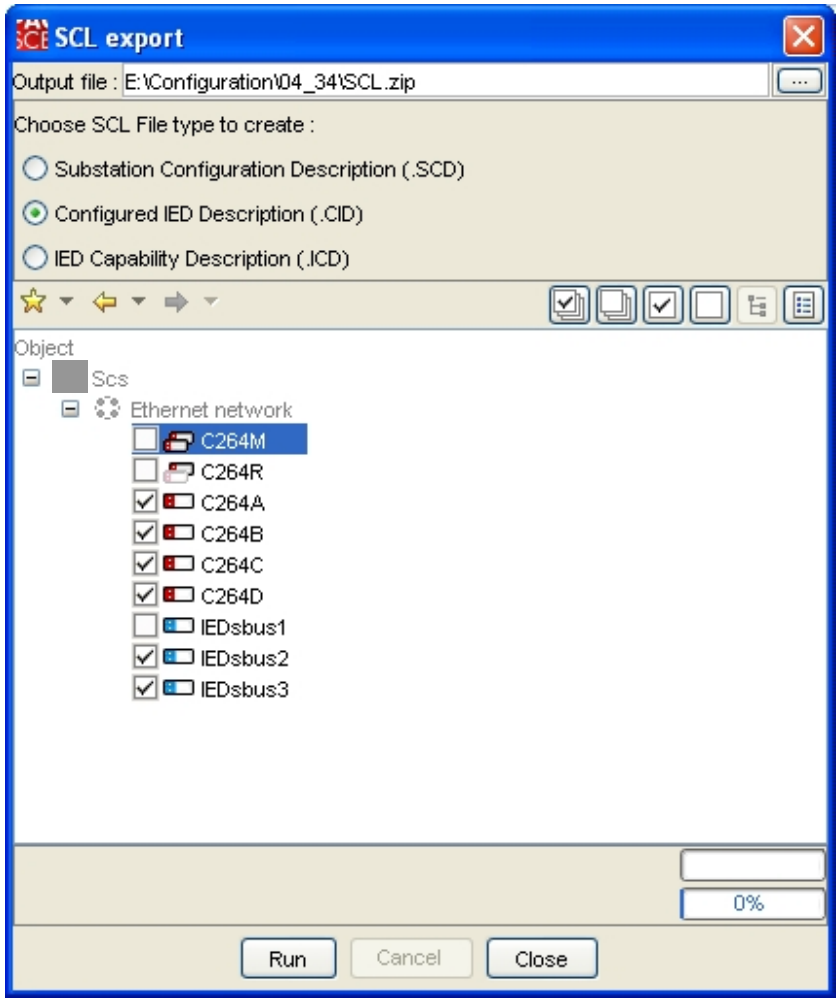



FIGURE 199 - TOOLS/EXPORT IEC61850 SELECTION

4. Enter the name of the output file in the **Output file** field ( zip extension)

5. Select the SCL file type to create: .SCD, .CID or .ICD. If .SCD is chosen all devices are selected.

6. Click the **Run** button

7. The action progression is displayed graphically. This progression can be followed in three ways:

   – the progress bar is animated to display the percentage of achievement of the process (the value is a ratio of number of treated items),

   – the messages displayed on status bar which are specific of each using,

   – the nodes of the browser change in function of their processing state to follow processing.

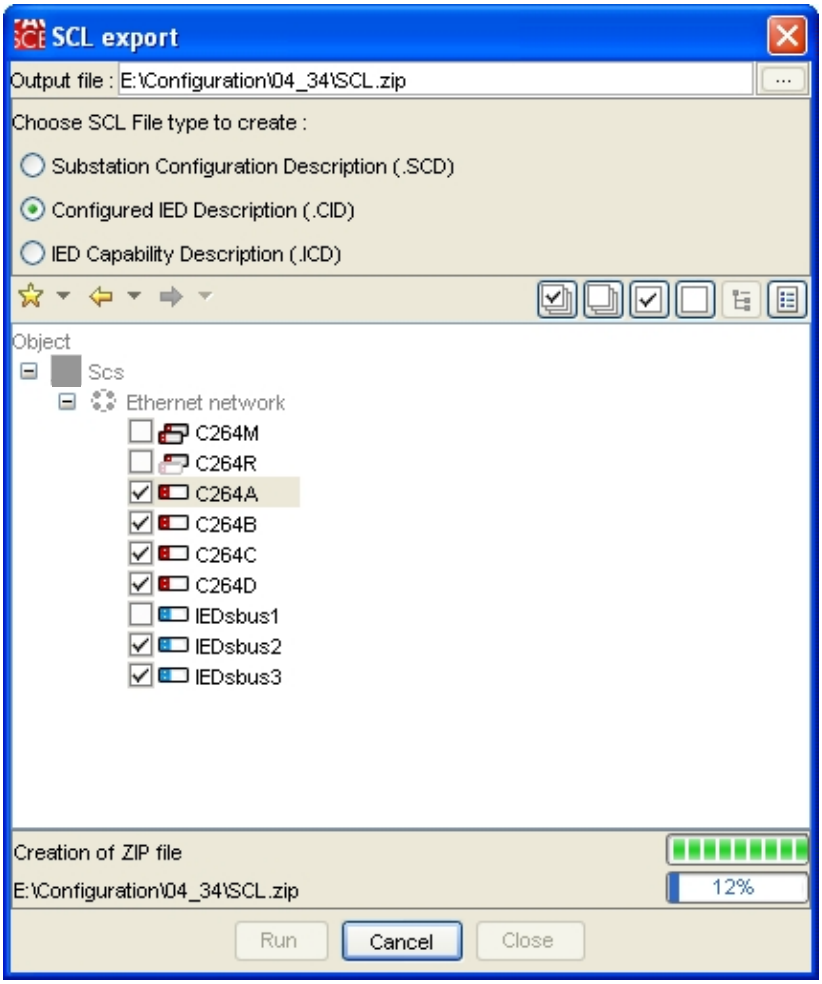



FIGURE 200 - TOOLS/EXPORT IEC61850 RUNNING

8. The Export action could be cancelled at any moment.
9. The exported files are stored in the given ZIP file.

4.6.12 Tools/Import IEC61850 SCD…

Purpose:

- This import is used to update a set of IEC61850 IEDs in the SCE database with data configured outside the SCE in an IEC61850 configuration file ( .scd extension)

Availability:

- A database is open

Other call:

- None

Operation:

1. Select **Tools/Import SCD…** item. The **SCD import** dialog box is displayed. In this dialog box are listed all the IEDs of the database (spare and template objects are not listed).

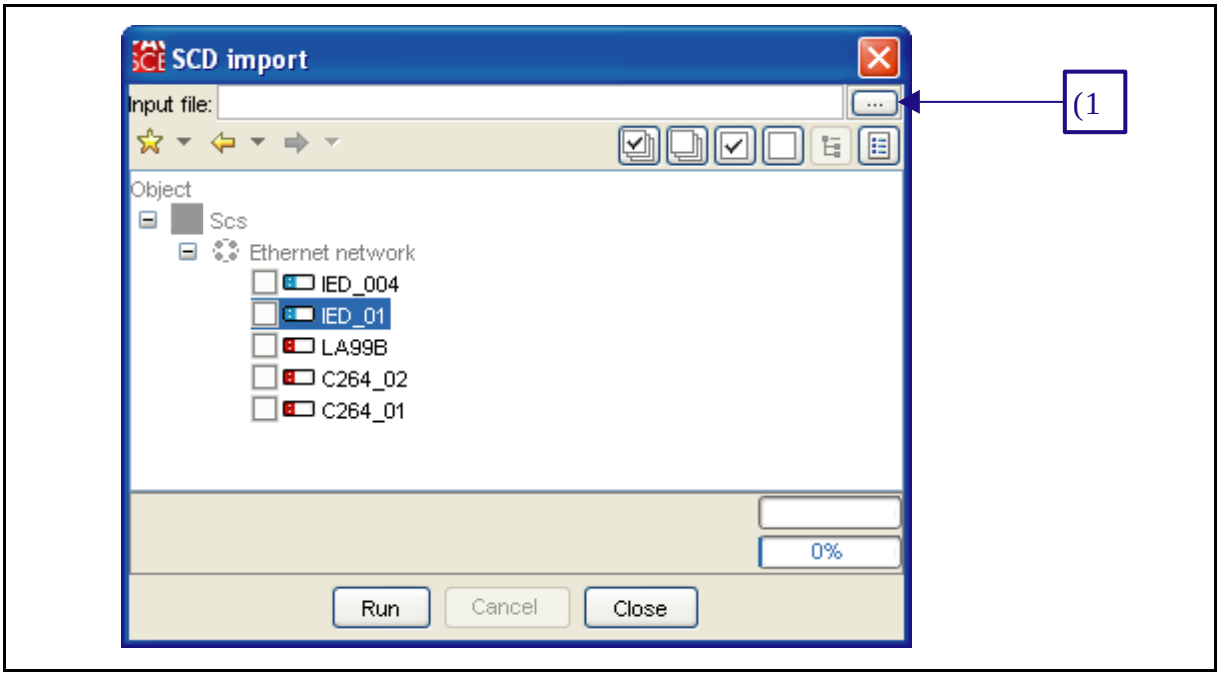



FIGURE 201: SCD IMPORT DIALOG BOX

2. Click the browse button (1) to open a **Select file** dialog box. When the **scd** file is selected its name is displayed in the **Input file** field (2).The IEDs whose network name is present in the SCD file ( **IED name** field) are automatically selected and associated to the related description (3).

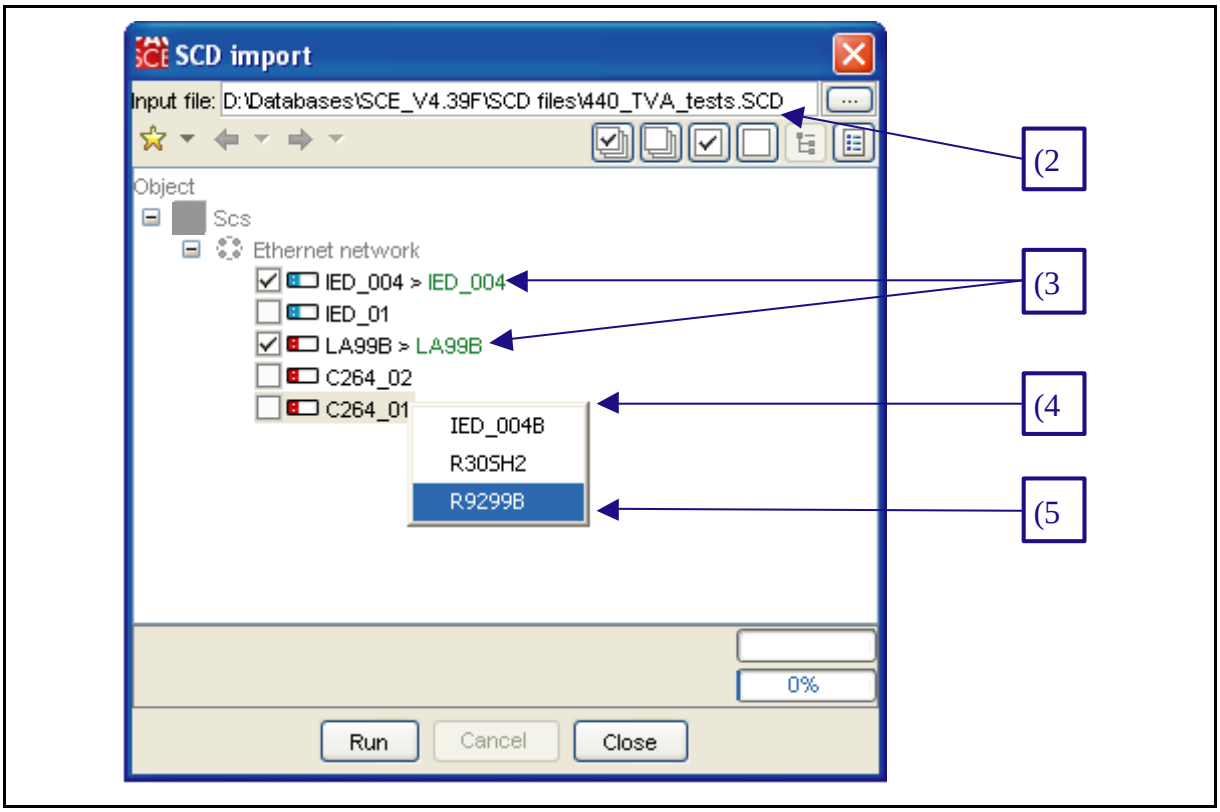



FIGURE 202: SCD IMPORT DIALOG BOX

3. By right-clicking on a no-associated IED a contextual menu is displayed (4). In this menu are listed the no-yet associated descriptions present in the SCD file. By clicking the wanted IED (5) the association is done (6).

   Note: the first item of this contextual menu is **Remove association** if the right-click is done on an associated IED. This item is of course used to remove an existing association.

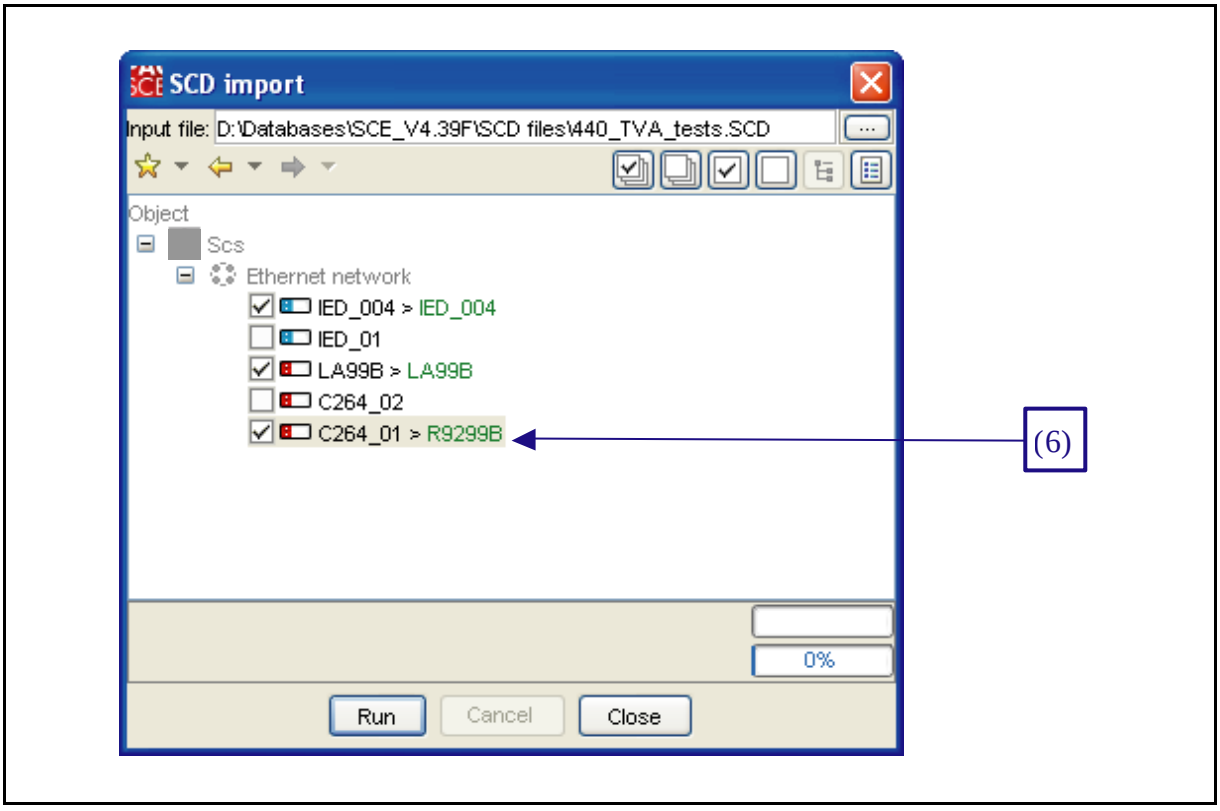



FIGURE 203: SCD IMPORT DIALOG BOX: ASSOCIATION DONE

4. After having defined the associations the user can select/unselect the IEDs to update in the the database. Only associated IEDs can be selected.

5. The user ends this import operation by clicking the **Run** button. The selected IEDs are checked for coherency with imported ones. If all IEDs are compliant they are updated with data found in the SCD file: network name, IP address and goose information If at least one IED is not compliant the import is not done and all non compliant IEDs are displayed in red. For these IEDs the non compliant elements of imported IED are logged in the **Trace** panel.

4.6.13 Tools/Manage IEC61850 IED…

Purpose:

- manage the list of IEC61850 IED model files (which are xml files)

Availability:

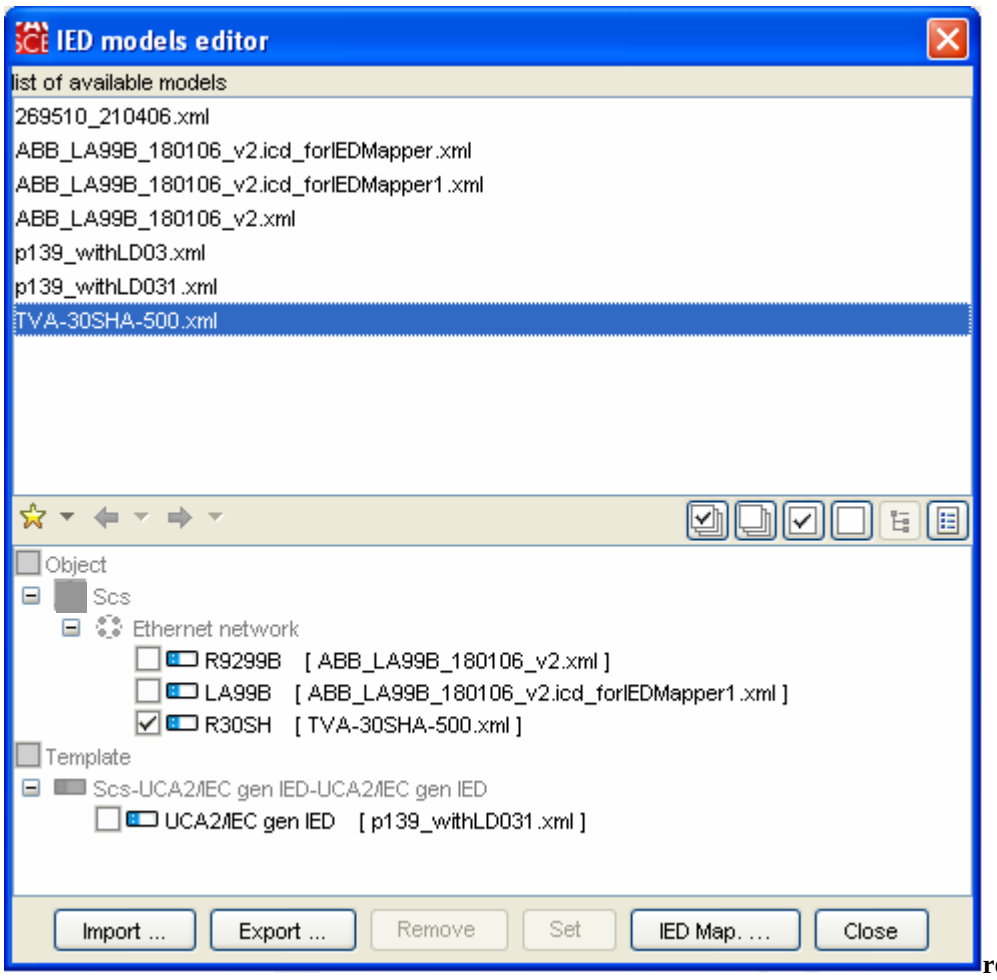
- Right dependent

Other call:

- None

Operation:

- Select **Tools/IED Management…** item. The following modal dialog box appears:




**reur ! Objet incorporé incorrect.**

FIGURE 204:- TOOLS/IED MANAGEMENT…

In this dialog, there are two parts:

- the list of **available model files**,
- the list of **existing IEC61850 IED**.

The list of existing IEC61850 IED is always displayed, and for each, the current model is indicated if exists.

When a model is selected, the IEC61850 IED that has the selected model is ticked.

Then, five actions are possible through this dialog box. When the database is read-only, only Export action is possible.

- **Import**: to append model files (XML or ICD files)
- **Export**: to save his models outside of the database directory
- **Remove**: to delete unused models form the library. When a model is used by an IED, the **Remove** button is not active.
- **Set**: to associate (change or add) a model to an existing IED.
- **IED Map**: to update mapping of private classes of the IED to PACiS common classes. The **IED Map** button is active when a model is selected. The update of a model make all IEDs which use this model to be updated to allow structure modification if needed. When importing a model file, if it's an ICD file, it is automatically transformed to an XML file. Then, for all imported model file, the IED Mapper is called to review classes association if needed.

### 4.6.13.1 The IED Mapper

By clicking the **IED Map** button the following dialog box is displayed:

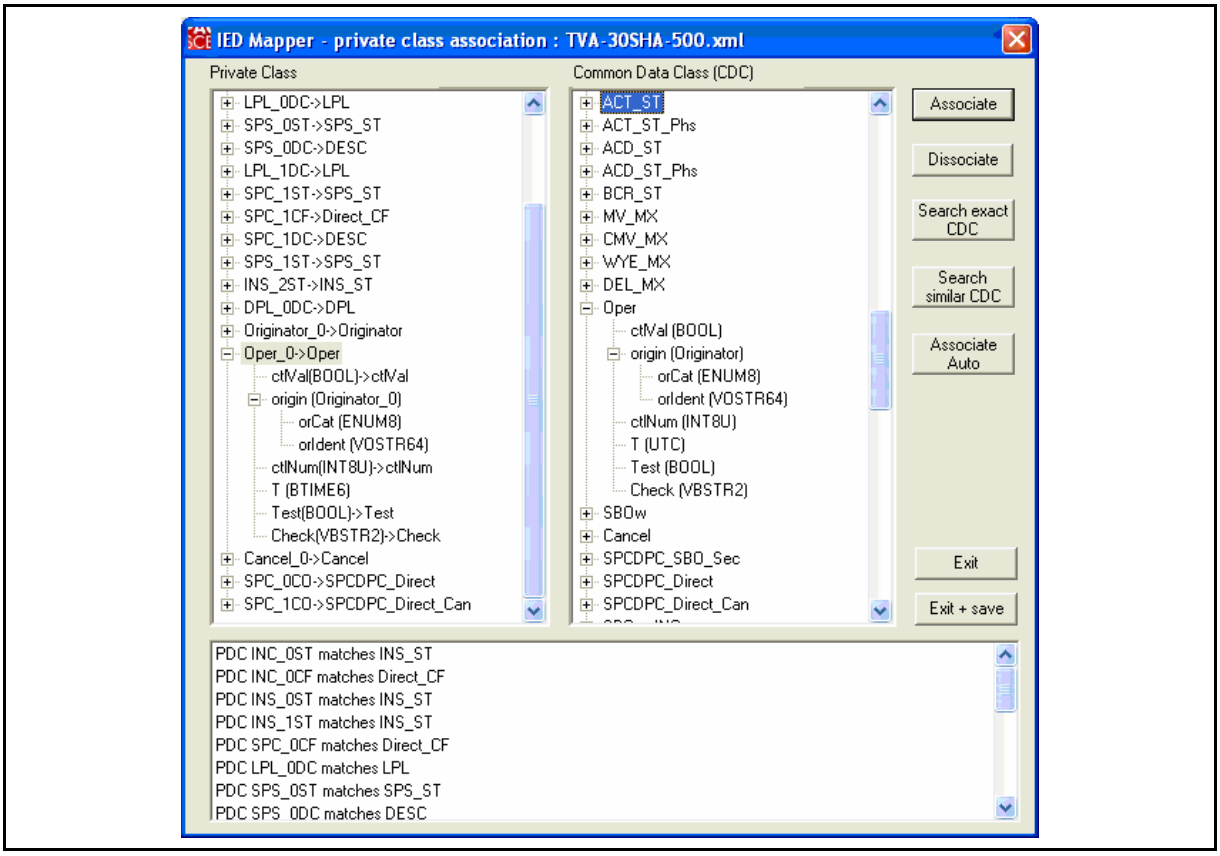



FIGURE 205: THE IED MAPPER DIALOG BOX

This window allows user to associate private classes of a non PACiS IED to common classes defined in PACiS.

This work is necessary for PACiS equipments to understand what other equipments say.

This association map an unknown type of data (called Private Class) to a known one (called Common Class). It works on attributes defined for these data to matching them.

The title bar of this dialog displays the currently edited file. In this way, when importing multiple files, the user knows on which he work.

There are three panels:

- The private class presents the list of private classes in tree view, to view the contents of each class,
- The common class presents the list of classes know by PACiS equipments, in tree view too,
- The bottom panel is a log of actions.

The goal of this dialog is to associate a private class to a common class. To do this the user has five actions represented by five buttons:

- “Associate” is used to associate the private class selected in left panel to common class selected in right panel,
- “Dissociate” remove association of currently selected private class
- “Search exact CDC” indicate to user the common class which match exactly the selected private class, if exists, select it in common class list, and write it in log panel,
- “Search similar CDC” indicate to user the common classes which looks like the selected private class, if exists, select the first one in common class list, and write them in log panel,
- “Associate Auto” launch a process which search all matching common classes for all private ones and associate them automatically if found.

The two latest buttons are use to quit IED mapper, the first without saving, and the second with saving the model.

When a private class (or sub-class) is associated to a common class, it’s shown by adding the common class name on left of the arrow (->)

When an association is done manually, if some sub-classes are not automatically mapped, a subclass association dialog box is displayed to allow user mapping them manually:

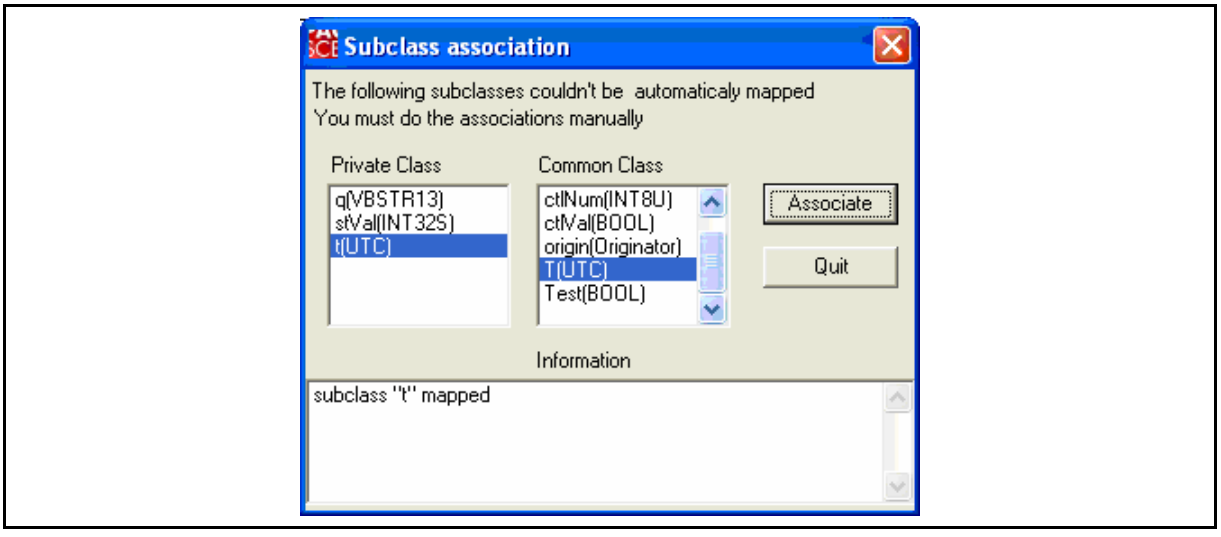



FIGURE 206: SUBCLASS ASSOCIATION DIALOG BOX

It works like main dialog box, but specialized for a sub set of classes.

After closing this dialog box, the association is done.

### 4.6.14 Tools/Languages…

Purpose:

This dialog box allows the user to manage the configuration and HMI languages.

This window allows to modify the following languages:

- Current languages: the language used to display user interface and database contents or creation,
- Database languages: languages that are defined in a database,
- Generation languages: used to localize C264 and OI devices.

Availability:

The dialog box is always available, even if no database is opened. Available actions depend on context:

- no database is opened:

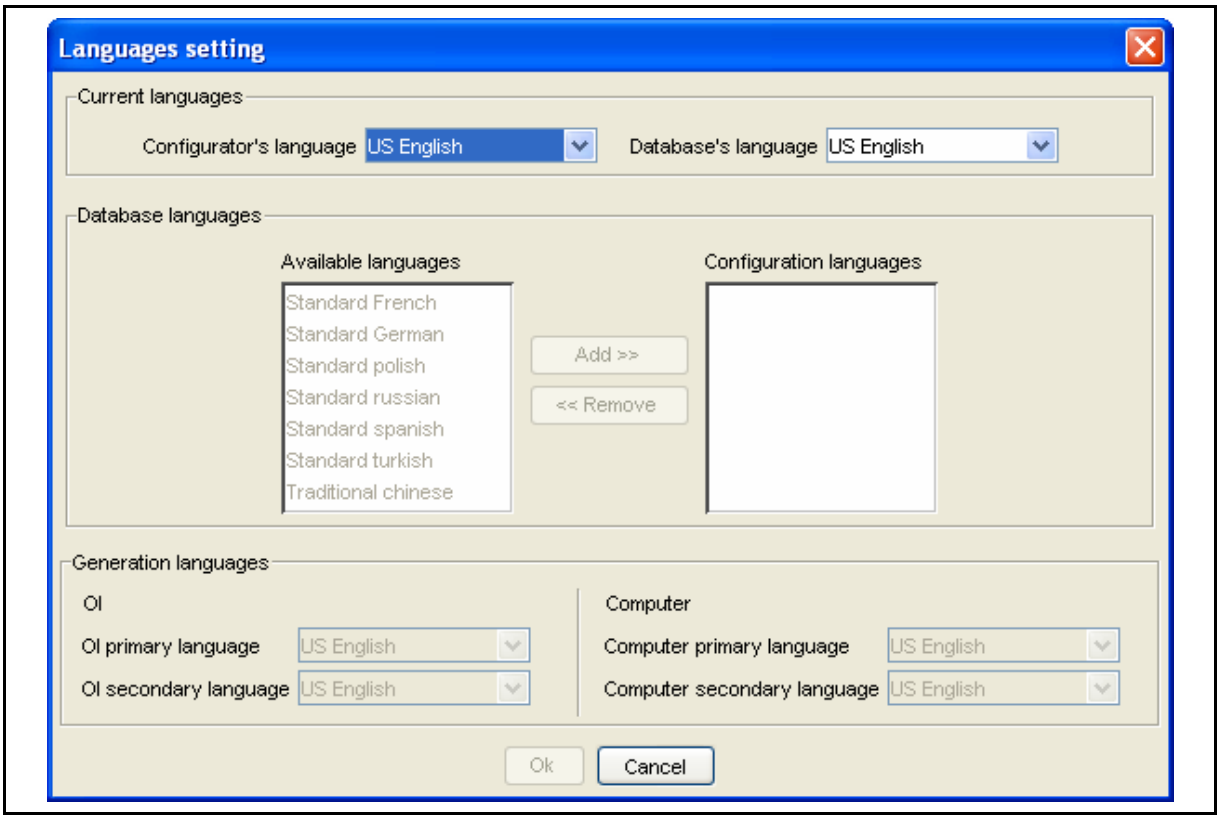



FIGURE 207: LANGUAGES SETTING WHEN NO DATABASE IS OPENED

- a database is opened:

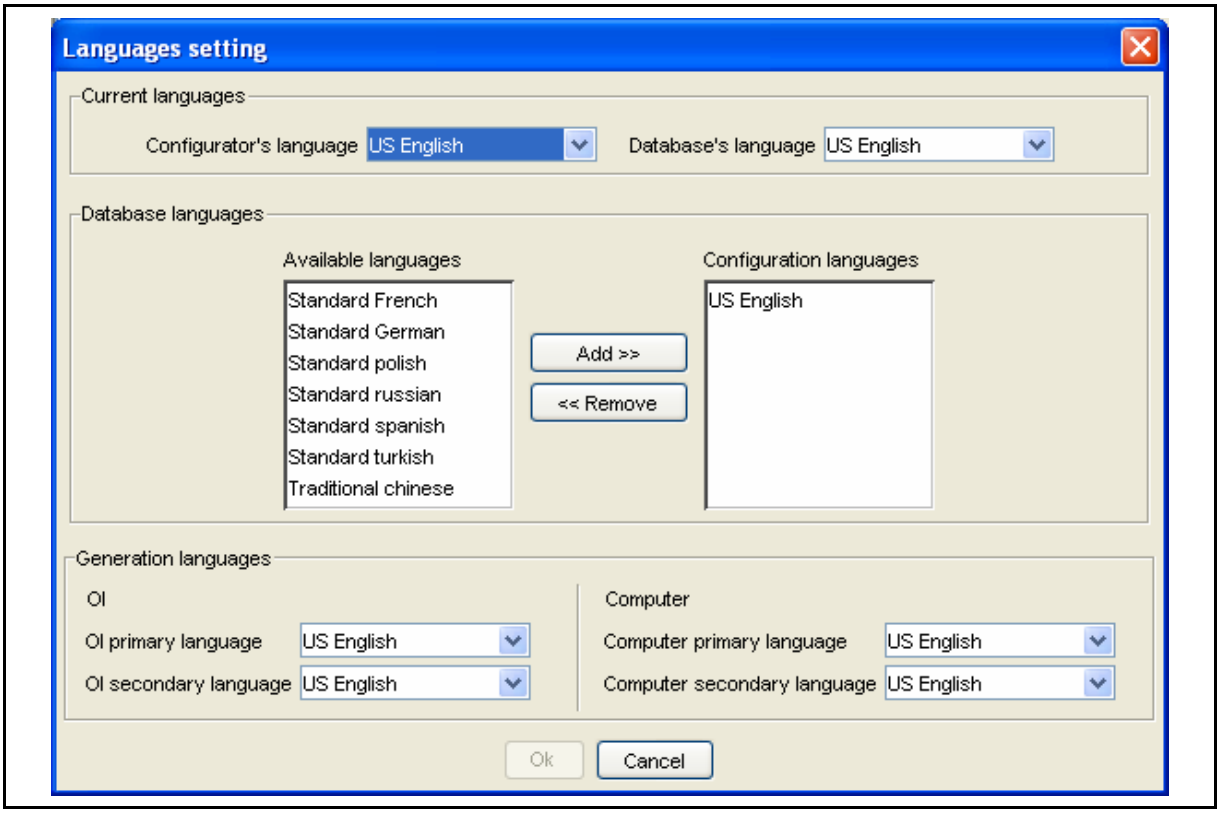



FIGURE 208: LANGUAGES SETTING WHEN A DATABASE IS OPENED

- a released database is opened:

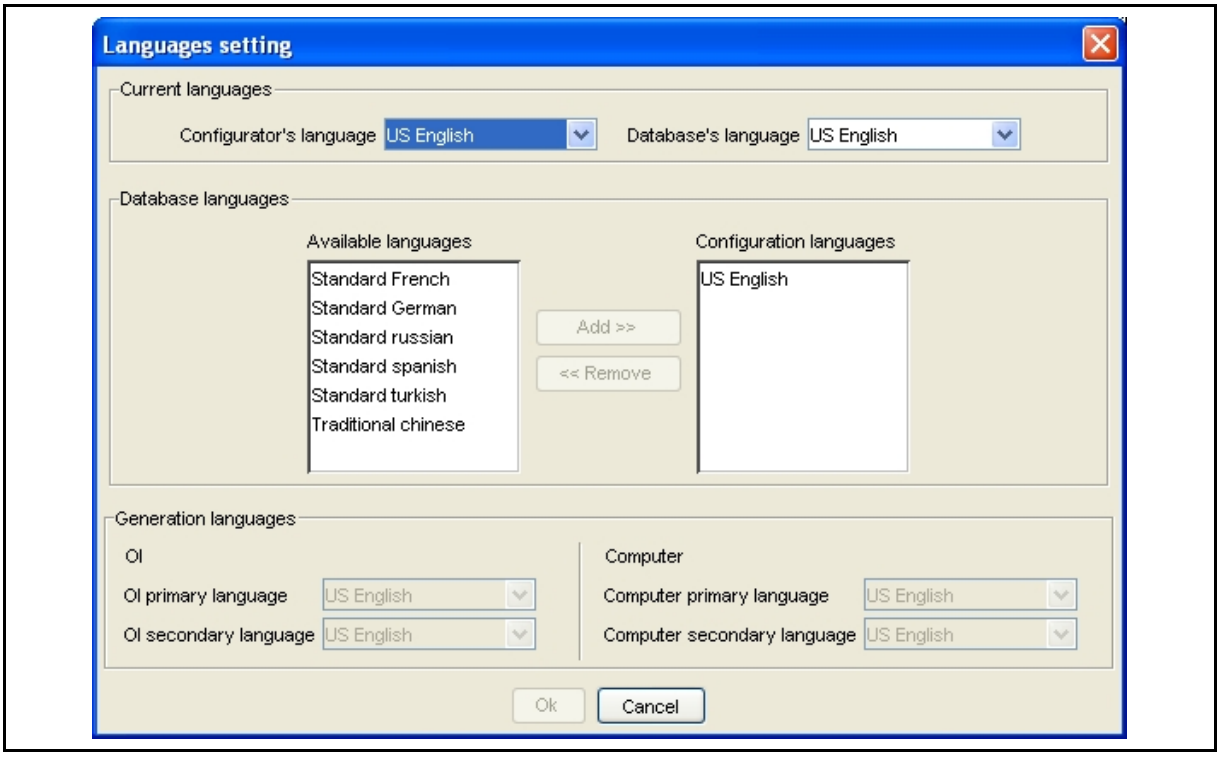



FIGURE 209 - LANGUAGES SETTING WHEN A RELEASED DATABASE IS OPENED

**Cancel button** is always available and close the dialog box without applying modifications.

**OK button** is available only if allowed modifications have been done in language selection. Modifications are identified by an asterisk ('*') for each modified field. Clicking on OK validates the modifications.

Other call:

- None

Operation:

**Current languages**

Two combo-boxes are available:

**Configurator's language** stands for the language used to display the user interface (i.e. the menus, dialog boxes, the button tool tips, labels…),

**Database's language** has two meanings, depending on context. At first, if no database is opened, the language indicates in which language a database must be created. Secondly, if a database is opened, it indicates in which language the database content must be displayed (i.e. the values of attributes).

When a database is opened, the displayed database language is set to current configurator's language if the language is defined in database, or else, the first created language of the database is chosen.

**Database languages**

All languages of the current configuration appear in the list Configuration languages.

The remaining available languages appear in the list Available languages.

**Add button**: to add the selected languages from the "available" list to the configuration. When a language is added all its multi-languages attributes are copied from the current configuration language to the new one if its value is different than default value: if the attribute hasn't been updated by user, the translated default value is used for the new language.

**Remove button**: to remove the selected languages from the "configuration" list from the configuration. The current language of the PACiS SCE can not be removed.

Adding and removing are effective only when **OK button** is clicked.

**Generation languages**

These languages are used to localize the generated databases for PACiS OI and PACiS C264 devices.

The languages list could be a subset of configured languages. For the moment, the C264 does not accept Chinese and Turkish languages.

4.6.15 Tools/Dictionary…

Purpose:

- Open a dictionary editor with all configurable labels that can be translated.

Availability:

- Right dependent

Other call:

- None

Operations:

1. Select Tools/Dictionary item
2. Select the languages to edit and the reference language.

FIGURE 210:DICTIONARY LANGUAGES SELECTION

3. Click the **Next>>** button: the following modal dialog box appears:

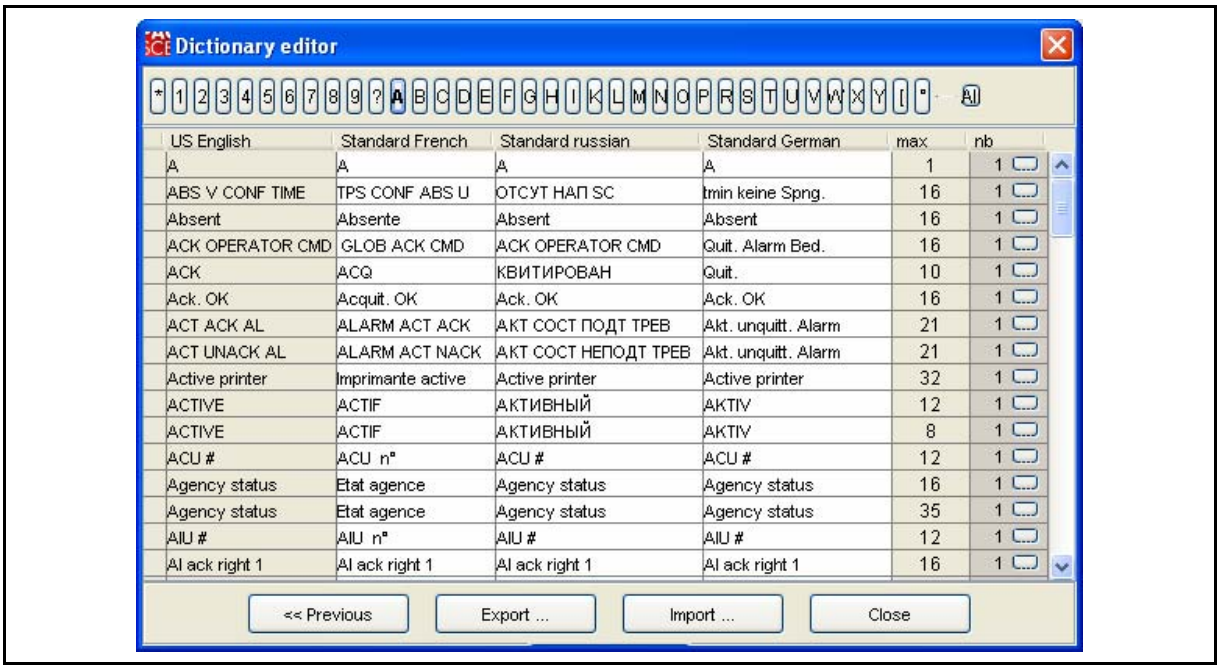

Dictionary editor
* 1 2 3 4 5 6 7 8 9 ? A B C D E F G H I K L M N O P R S T U V W X Y [ ° All
US English | Standard French | Standard russian | Standard German | max | nb
A | A | A | A | 1 | 1
ABS V CONF TIME | TPS CONF ABS U | ОТСУТ НАП SC | tmin keine Spng. | 16 | 1
Absent | Absente | Absent | Absent | 16 | 1
ACK OPERATOR CMD | GLOB ACK CMD | ACK OPERATOR CMD | Quit. Alarm Bed. | 16 | 1
ACK | ACQ | КВИТИРОВАН | Quit. | 10 | 1
Ack. OK | Acquit. OK | Ack. OK | Ack. OK | 16 | 1
ACT ACK AL | ALARM ACT ACK | АКТ СОСТ ПОДТ ТРЕВ | Akt. unquitt. Alarm | 21 | 1
ACT UNACK AL | ALARM ACT NACK | АКТ СОСТ НЕПОДТ ТРЕВ | Akt. unquitt. Alarm | 21 | 1
Active printer | Imprimante active | Active printer | Active printer | 32 | 1
ACTIVE | ACTIF | АКТИВНЫЙ | AKTIV | 12 | 1
ACTIVE | ACTIF | АКТИВНЫЙ | AKTIV | 8 | 1
ACU # | ACU n° | ACU # | ACU # | 12 | 1
Agency status | Etat agence | Agency status | Agency status | 16 | 1
Agency status | Etat agence | Agency status | Agency status | 35 | 1
AIU # | AIU n° | AIU # | AIU # | 12 | 1
AI ack right 1 | AI ack right 1 | AI ack right 1 | AI ack right 1 | 16 | 1
<< Previous
Export ...
Import ...
Close

FIGURE 211: TOOLS/DICTIONARY … DICTIONARY MANAGER

Tool bar:

- The upper tool bar is used to select the labels that must be displayed in the edition area. The selected letter corresponds to the **first letter of the label** in the reference language.
- Only the letters that actually correspond to **existing labels** in the reference language are showed. For instance, if there is no word beginning by the ‘a’ letter in the reference language then the ‘A’ letter will not be present in the tool bar.
- The ”**ALL**” word allows displaying **all the entries** of the dictionary.

Edition area:

- The **greyed parts** can not be edited by the user. The reference language labels are greyed, unlike the target languages labels.
- The **first column** shows a “mark” if the translation of the corresponding entry was modified.
- A **contextual menu allows to cancel** the modifications of this entry and thus to retrieve the initial values of all translations.
- The user can directly edit a translation inside the cell of a **target language column**.
- The **max length** column contains the maximum length of the label translations.
- The **attribute column** shows the attributes number that are associated with this label. A button allows to display a windows tree structure with all attributes holding this label. This button is contextual and it is displayed when the entry is selected.

Buttons area:

- The **Previous** button leads to the dictionary language selection dialog box in order to change the languages to the current dictionary. This button is greyed if at least one entry is marked as modified by an asterisk in the first column.
- The **Apply** button updates the configuration database with the last modifications without closing the window. After pushing this button, all asterisks are removed from the first column.
- The **Close** button closes the dialog window. If there is some modified field, the PACiS SCE asks to the user to save the data before closing windows.
- The **Cancel** button closes the window discarding the last modifications.
- The **Export** button saves the dictionary as an XML file.
- The **Import** button allows entering a dictionary from an XML file.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<Root>
    <Header>
        <Date>Thu Sep 09 16:45:47 CEST 2004</Date>
        <Conf>D:\databases\338\338_mydb\338_myDb.mpc</Conf>
        <HRef>US English</HRef>
        <HTarget>Standard spanish</HTarget>
    </Header>
    <Entry max="16">
        <Ref lge="US English">GLB ACK ALARM</Ref>
        <Target lge="Standard spanish">ACQ GLOBAL ALARM</Target>
    </Entry>
    <Entry max="16">
        <Ref lge="US English">GLB CLR ALARM</Ref>
        <Target lge="Standard spanish">BORRADO GBL ALMR</Target>
    </Entry>
    <Entry max="16">
        <Ref lge="US English">GLOBAL CLR ALARM</Ref>
        <Target lge="Standard spanish">ALARMAS BORRADAS</Target>
    </Entry>
```

FIGURE 212 - EXTRACT OF A DICTIONARY XML FILE

## 4.7 Window

For a full description of this menu, see §3.2.2 Selecting displayed area in working window.

# 5. TRACES WINDOW

This area of the docking window is reserved for database developers. The aim is to study trouble at maintenance level, and to **keep precise traces** of database modifications (for example between two database evolutions asked by customer).

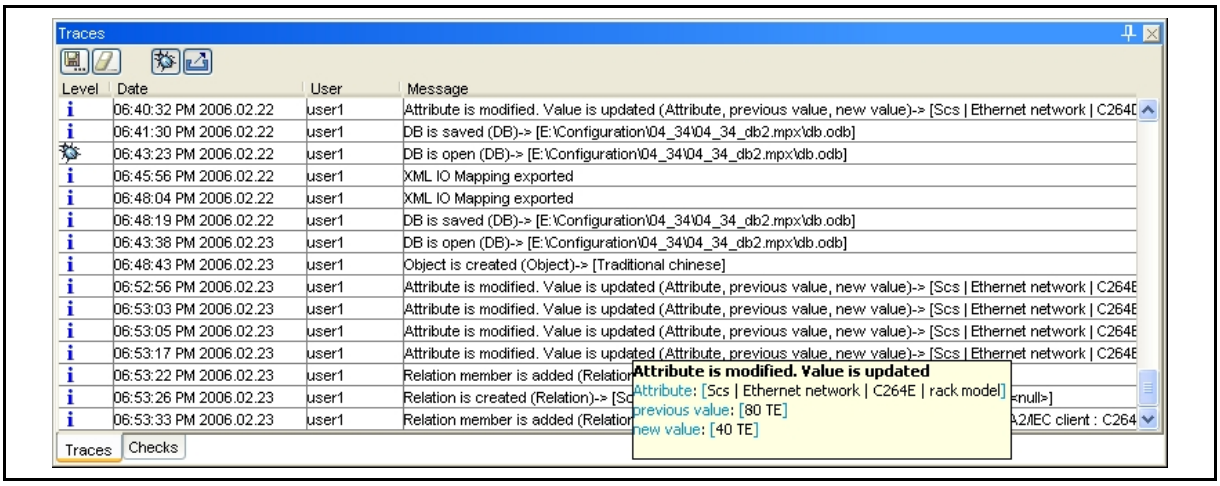

Traces
Level
Date
User
Message
06:40:32 PM 2006.02.22 user1 Attribute is modified. Value is updated (Attribute, previous value, new value)-> [Scs | Ethernet network | C264E
06:41:30 PM 2006.02.22 user1 DB is saved (DB)-> [E:\Configuration\04_34\04_34_db2.mpx\db.odb]
06:43:23 PM 2006.02.22 user1 DB is open (DB)-> [E:\Configuration\04_34\04_34_db2.mpx\db.odb]
06:45:56 PM 2006.02.22 user1 XML IO Mapping exported
06:48:04 PM 2006.02.22 user1 XML IO Mapping exported
06:48:19 PM 2006.02.22 user1 DB is saved (DB)-> [E:\Configuration\04_34\04_34_db2.mpx\db.odb]
06:43:38 PM 2006.02.23 user1 DB is open (DB)-> [E:\Configuration\04_34\04_34_db2.mpx\db.odb]
06:48:43 PM 2006.02.23 user1 Object is created (Object)-> [Traditional chinese]
06:52:56 PM 2006.02.23 user1 Attribute is modified. Value is updated (Attribute, previous value, new value)-> [Scs | Ethernet network | C264E
06:53:03 PM 2006.02.23 user1 Attribute is modified. Value is updated (Attribute, previous value, new value)-> [Scs | Ethernet network | C264E
06:53:05 PM 2006.02.23 user1 Attribute is modified. Value is updated (Attribute, previous value, new value)-> [Scs | Ethernet network | C264E
06:53:17 PM 2006.02.23 user1 Attribute is modified. Value is updated (Attribute, previous value, new value)-> [Scs | Ethernet network | C264E
06:53:22 PM 2006.02.23 user1 Relation member is added (Relation
06:53:26 PM 2006.02.23 user1 Relation is created (Relation)-> [Sc
06:53:33 PM 2006.02.23 user1 Relation member is added (Relation
Attribute is modified. Value is updated
Attribute: [Scs | Ethernet network | C264E | rack model]
previous value: [80 TE]
new value: [40 TE]
Traces
Checks

FIGURE 213 - TRACE WINDOW DISPLAY

The display is based on 5 resizable columns with:

1. The **Level** field is one of the following trace levels: Information, Error, Warning, Debug, Fatal Error.
2. The **Date** field is the recording date/time of the trace.
3. The **User** field is the identification of the logged user.
4. The **Source** field is the PACiS SCE class component that generates the trace. It is displayed **only when Debug** traces are displayed.
5. The **Message** field is the text message of the trace.

Trace management is driven by 4 icons:

| | |
|---|---|
| | **Save** the displayed traces in a file selected through a file chooser. |
| | **Clear** the table. Traces are saved in the log file of the open configuration |
| | **Toggle for DEBUG traces**: If this button is selected, the DEBUG level traces are not displayed (they are filtered). Else they are. |
| | **Toggle for traces from event** manager of the PACiS SCE software (operator actions…) |

## 5.1 Trace saving

User saving:

The User can save the displayed traces **in a file** selected through a file chooser. The current log file is then saved into the given file. The file could be edited by an text editor. Field separator is a tab character.

Specific saving for configuration upgrades:

During opening of a configuration, an upgrade can be occurred (see File/Open). The traces sent by the upgrade process are automatically saved in a specific file. The file name is log<v.r>.txt, where <v.r> is the release number of the target configuration. It's stored in the configuration file. This file is a zip file.

Example:

A configuration database conf.mpx is opened with PACiS SCE with a release number 3.34. This operation needs an upgrade of the configuration database. The upgrading operations are logged in a file log3.34.txt. This file is stored in configuration database file conf.mpc which is a zip file.

With this feature, all upgrading operation of configuration database in stored in its file and could be consulted. The files of .mpc are the following:

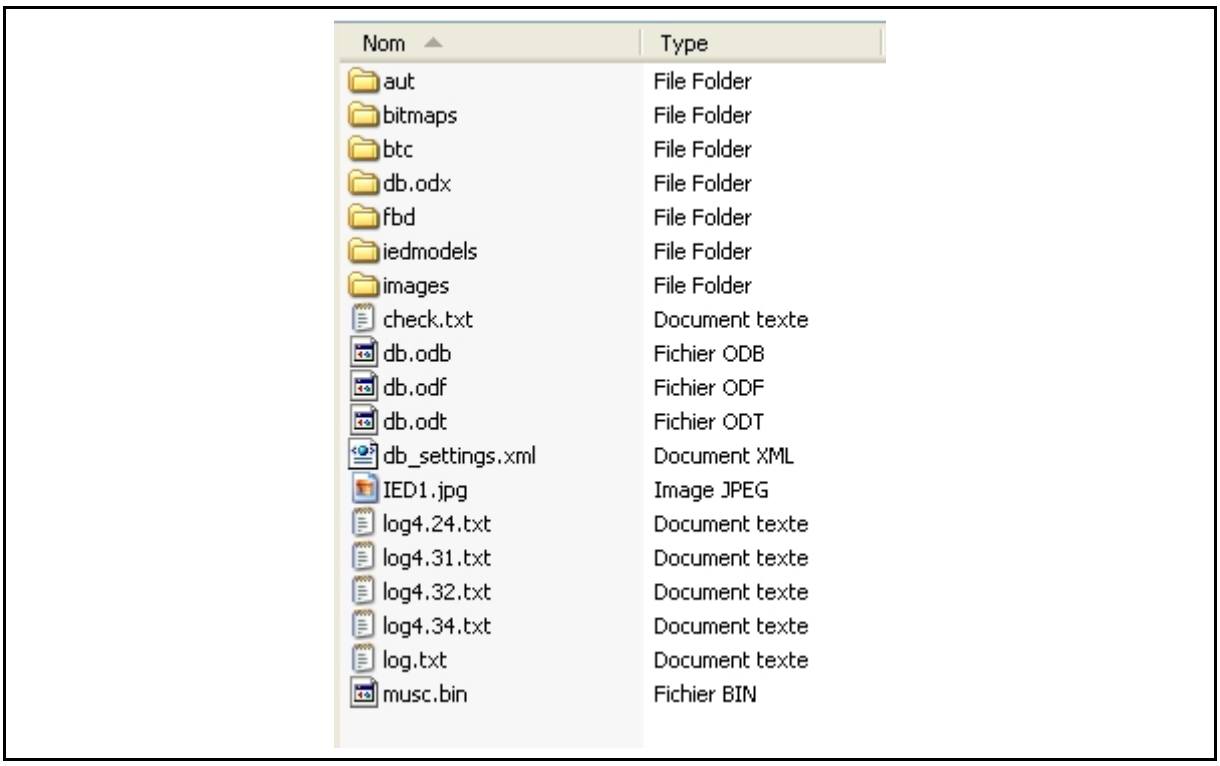



FIGURE 214 - MPC CONTENTS AND UPGRADING ACTIONS LOG FILES

Automatic saving:

The **maximum number** of traces in the table is configured in the **General Settings**.

When this maximum is reached, the non DEBUG level traces are automatically saved in the log file of the open configuration and the table is cleared. The file name is log.txt. It's stored in the configuration zip file.

If the size of the current log.txt file is greater than 15 MB, then this file is saved as log(i).txt (where i is an incremented number) and a **new log.txt file** is created for the new traces.

When the **Check-In** action is applied to a configuration, the traces are automatically saved in the frozen configuration, the log file of the current configuration is **reset**.

When the **Check-Out** action is applied to a configuration, the new work configuration is created from the frozen one, but the trace file (if any) is **discarded**.

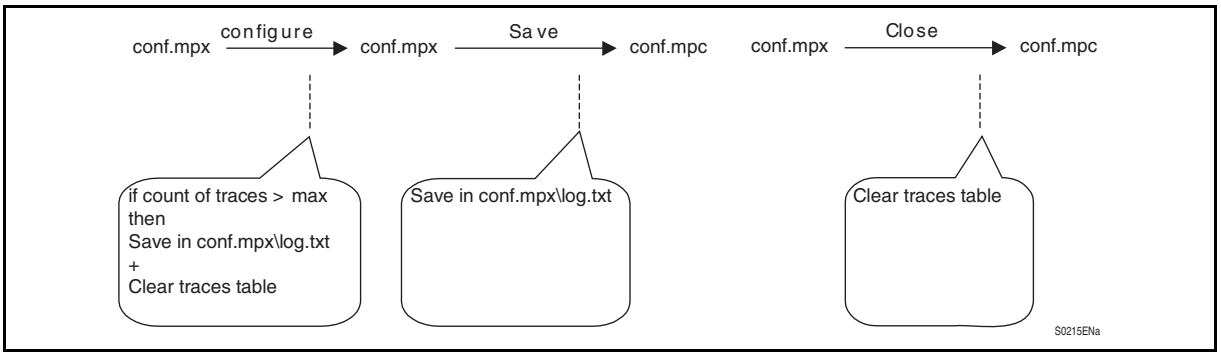



FIGURE 215 - LOG AND FILE OPERATIONS (1/3)

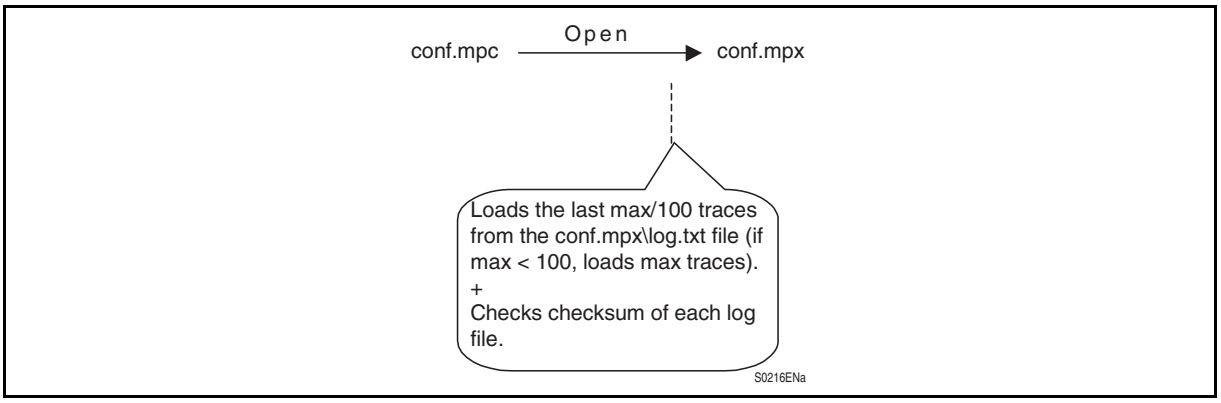



FIGURE 216 - LOG AND FILE OPERATIONS (2/3)

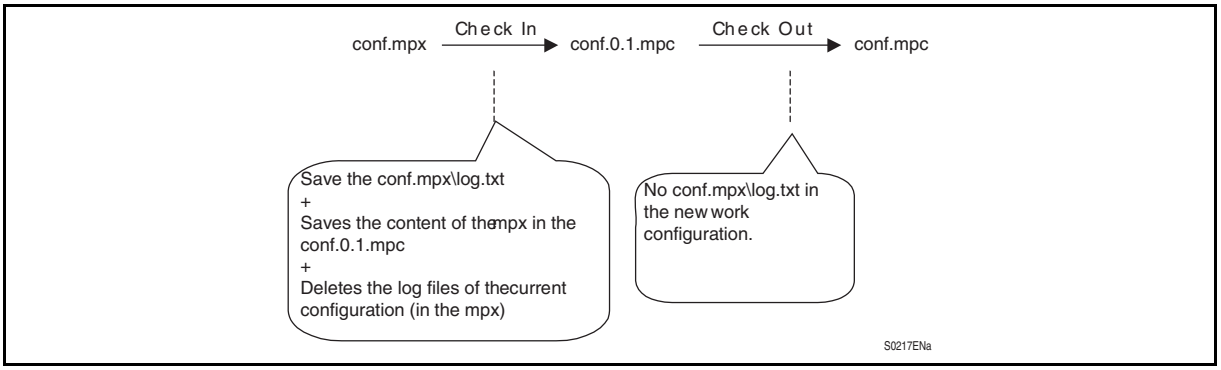



FIGURE 217 - LOG AND FILE OPERATIONS (3/3)

## 5.2 Trace log file checking

An ADLER32 **checksum** is associated to **each log file** (except upgrading log files).

When a configuration is opened, all the log files are checked. If one of them is missing or has its checksum not matching the one registered, then an **error trace is displayed**:

**Corrupted traces log file**

This feature prevents some external wrong manipulation of log files: any external modifications (add, suppress, modification of a log line; or add, suppress of a log file) are traced by this error.

# 6. FBD EDITOR

The **Logical Equation Viewer** is an application that allows the edition of one equation (FBD logic diagram).

It is launched from the menu item Workbenches/FBD Edit (see § 4.5.3).

- either at the **creation**: only with the I/O slots declared as I/O parameters in PACiS
- or at the **modification**: with the schema already entered and eventually a redefinition of the inputs/outputs.

The **Function Block Diagram** language combines functions and function blocks interconnected by signal flow lines in order to define function block diagram networks.

The Equation Viewer allows the programmer to build equations by taking existing blocks from libraries, defining data flow between functions, …

The application can **print** a view on as many folios as required to cover the full content of this view. Boundaries of printed folios are clearly indicated on the FBD view.

The application is also able to open **on-line help** following the chosen language.

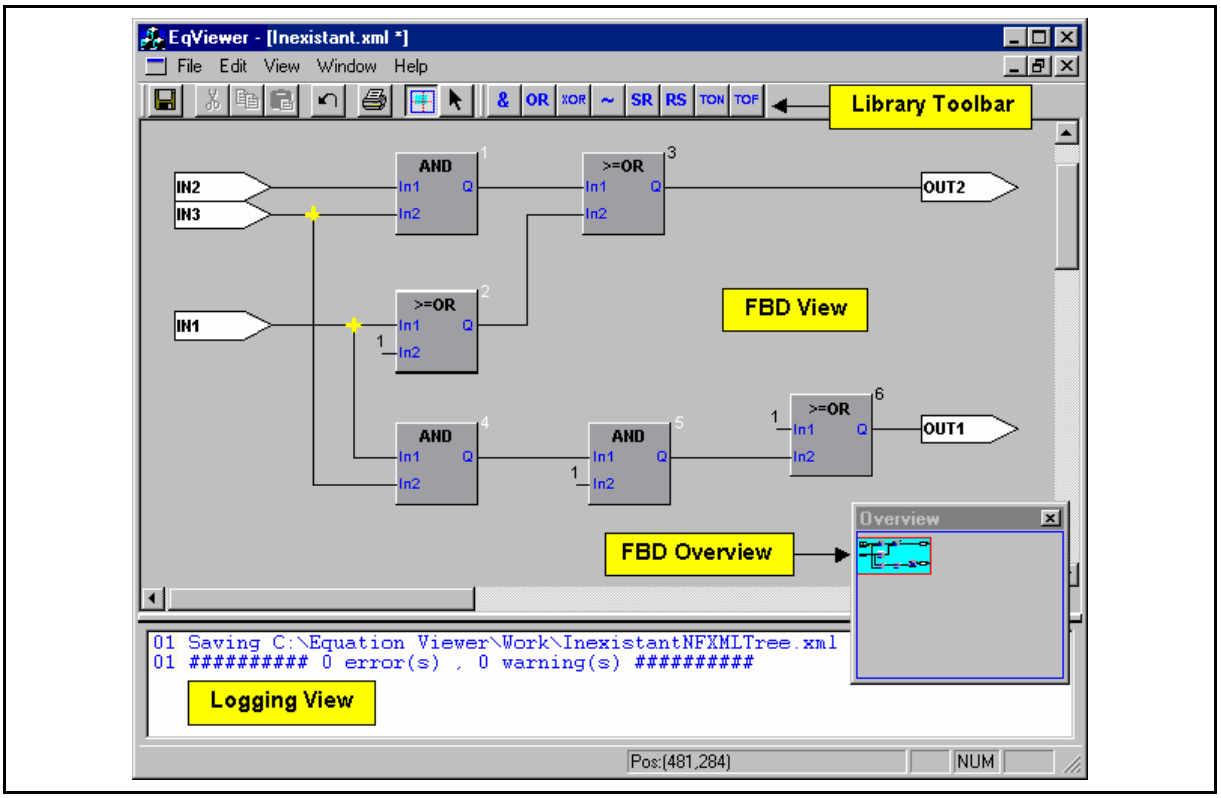
In addition, text annotations may be used to document the logic.

## 6.1 Generalities of FBD

The views exposed by this application are several **FBD Views** of the same document.

Through these views it will be possible to edit the equation logic.

- a **Logging View** that shows warnings and error messages,
- a **FBD Overview** This overview shows the whole content of the FBD view,
- a **Library Toolbar** containing the whole set of FBD blocks of the library.




A FBD document gathers a lot of FBD networks needed to achieve functionality.

FBD documents are divided into pages. Page boundaries are set in order to have for instance almost 40 blocks on a page. Pages are the smallest entities that can be printed.

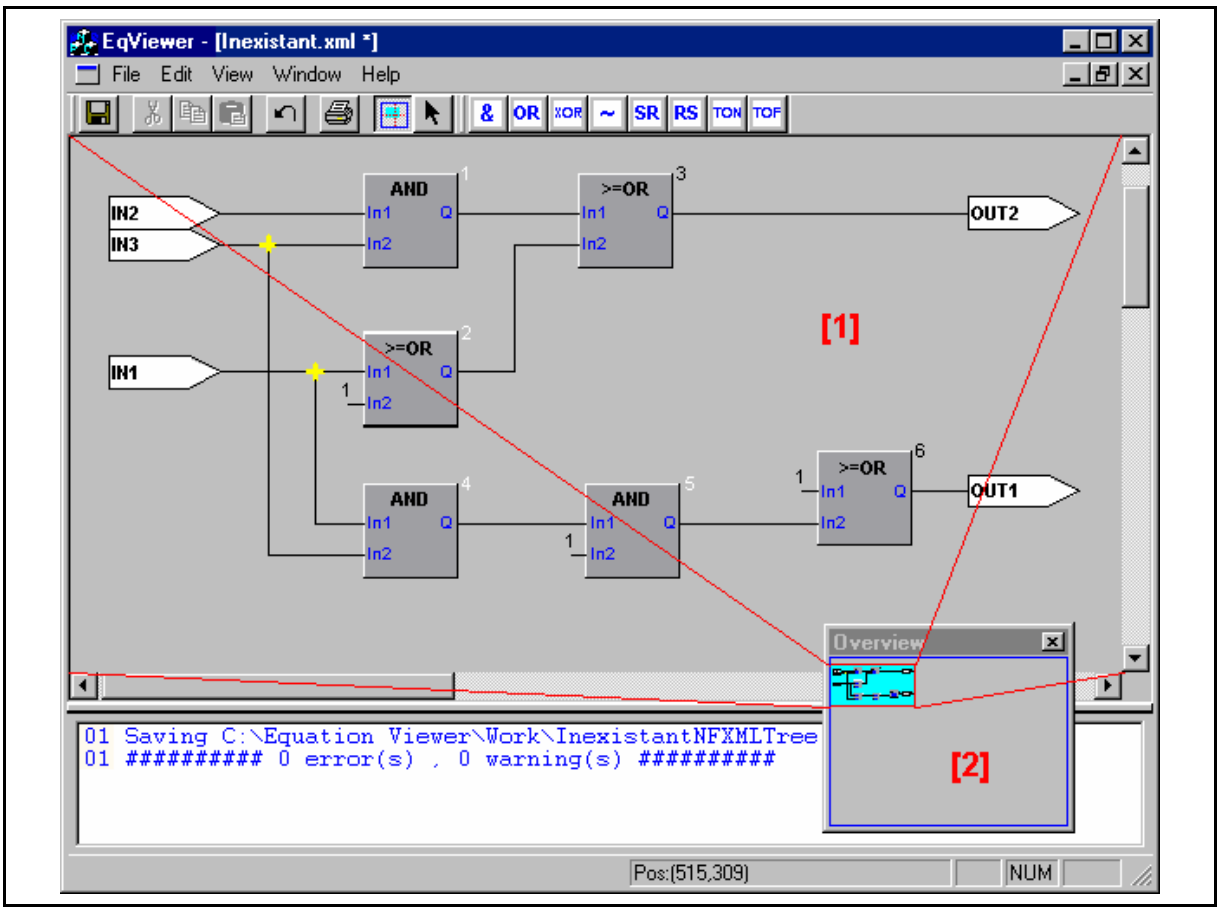
## 6.2 The FBD Editor Views

It displays the part of the equation logic that is currently edited.

The Editor View acts as a peephole to the document that may be too large to allow display of all FBD logic at once.

With the **scrolling facilities**, this peephole can be moved across the document to reveal different portions of it. Acting on the Overview or on the Editor View horizontal and vertical scroll bars may do this.

With the **zooming facilities**, it is possible to modify the zoom level of the Editor View for an improved readability. This may be achieved by acting on the Overview or on the Zoom dialog box.




### 6.2.1 FBD Editor View

**[1]**

**Close:** Like any window: you click on the **cross** at the upper right coin of the window.

**Scroll:** Scroll bars are available (horizontal and vertical) to move the peephole through the FBD document ; this movement is visible in the Overview window by the corresponding movement of the blue rectangle. You can also move the screen one page at a time by clicking left inside the scroll bar (see "Navigation Features").

**Zoom:** Resizing the Editor view leads to show a larger or lower part of the FBD Document. The size of the displayed graphical components is not modified when resizing the Editor view.

On the other hand, the size of the displayed components is modified if you change the zoom ratio with the Overview blue rectangle manipulation (see "Zoom Features").

**User Interactions**

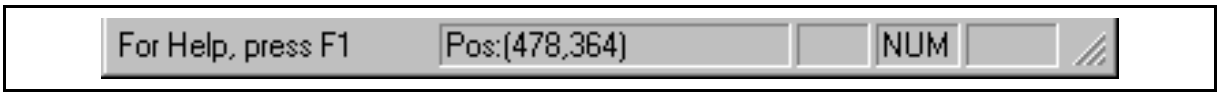
**Edition:** You can create a network by:

- dropping Blocks on the Editor view,
- linking these blocks with Signal Flow Lines, Connecting lines and Connections,
- defining input/output operands using slots and literals.

For more details about it, see § 6.4.5 Working with Functions and Function Blocks.

**Status Bar:** The status bar may be toggled on and off at the bottom of the window by using the **Status Bar** option in the **View** menu.

The status bar displays information about the activity associated to toolbar icons when the mouse cursor stays on these icons (standard behaviour of toolbar).




6.2.2 The FBD Overview

**[2]**

The Overview displays the whole content of the document.

On this Overview, a blue rectangle shows the current relative size and position of the active Editor View.

**Resize & Move the Overview**: you can move the overview like any window. On the other hand, resizing the overview has automatically an action vertically and horizontally.

**Drag the blue rectangle or click any location inside the Overview in order to change the Editor view content**: click left in the blue rectangle and, without releasing the mouse button, move the mouse to put the rectangle to another location **or** click left any location in the Overview ; the blue rectangle comes at this place and the Editor view is updated.

**Resize the rectangle in order to change the Editor view zoom level**: Select the bottom right corner of the blue rectangle: a double arrow appears. Without releasing the mouse button, resize the blue rectangle. The Editor view zoom ratio and content are updated.

Show the associated overview Choose the **menu option Window** and the item Overview.

### 6.2.3 Toolbar

The Toolbar may be toggled on and off at the top of the window by using the **Tool Bar** option in the **View** menu.

It may also be moved (standard behaviour of toolbar).

allows to save the current view.

allows to cut the selected element(s).

allows to copy the selected element(s).

allows to paste the element(s) held in the clipboard

allows to undo the last action.

allows to print the current view.

allows to display the Overview.

clears the current mouse function.

### 6.2.4 Library Toolbar

The Library Toolbar may be toggled on and off at the top of the window by using the **Library Toolbar** option in the **View** menu.

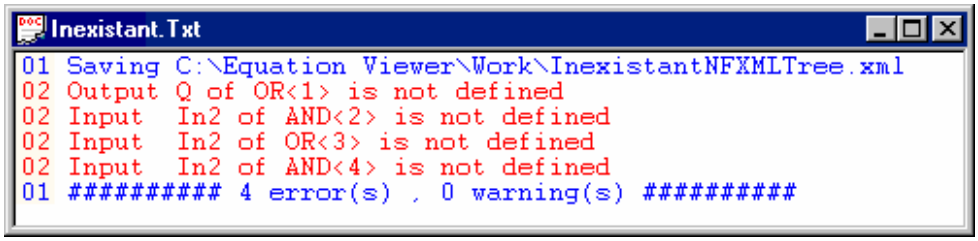
The Library toolbar contains all the buttons corresponding to the available function blocks. Two libraries are available: one for FBD Automation, another for FDB Interlock (with only Boolean function blocks).

FIGURE 218 - FBD AUTOMATION LIBRARY

FIGURE 219 - FBD INTERLOCK LIBRARY

| | |
|---|---|
| Boolean operators: | AND, OR, XOR, NOT |
| Bistable function blocks: | SR, RS |
| Timer function blocks: | TON, TOF |

### 6.2.5 Logging View


Inexistant.Txt
01 Saving C:\Equation Viewer\Work\InexistantNFXMLTree.xml
02 Output Q of OR<1> is not defined
02 Input In2 of AND<2> is not defined
02 Input In2 of OR<3> is not defined
02 Input In2 of AND<4> is not defined
01 ########## 4 error(s) , 0 warning(s) ##########

The Logging View will be mainly used to log messages from the ST translation process.

Each time a FBD document is saved an equivalent structured text (XML file) form is created.

Translation warnings and errors are logged into the logging view.

**MaxLines:** You can set the **maximum number of lines** that can be displayed in the Logging View:

Right-click in the background of the Logging View,

Select the **MaxLines** item,

In the edit field that appears, enter the maximum number of lines to display,

Press **OK** to confirm.

**CleanUp**: You can clear the content of the Logging View:

Right-click in the background of the Logging View,

Select the **CleanUp** item.

**File Save As**: You can save the content of this window in a file. This file must be defined with a file chooser.

### 6.2.6 Key Functions

Keyboard shortcuts are available for many functions in the FBD Editor window.

These functions and the corresponding keystrokes are grouped below by type.

#### 6.2.6.1 Moving around in the FBD Editor View

| KEYS | FUNCTION |
|---|---|
| ↑ | Move the view up by a smooth scroll |
| ↓ | Move the view down by a smooth scroll |
| ← | Move the view left by a smooth scroll |
| → | Move the view right by a smooth scroll |
| **Ctrl** ↑ | Move the view up by a half page |
| **Ctrl** ↓ | Move the view down by a half page |
| **Ctrl** ← | Move the view left by a half page |
| **Ctrl** → | Move the view right by a half page |
| **Page-Up** | Move the view up by an entire page |
| **Page-Down** | Move the view down by an entire page |
| **Home** | Move the view at the upper right corner of the document |
| **End** | Move the view at the lower left corner of the document |

6.2.6.2 Using File Functions

**CTRL + S**: To save the current equation

**CTRL + P**: To print the current equation

6.2.6.3 Getting Help

**F1**: Access to Online Help for the active window (help about the Equation Viewer) or the selected functional block (help about the selected block).

## 6.3 Understanding FBD

The Equation Viewer allows the programmer to build equations by taking existing blocks from libraries, assigning their input/output parameters, defining data flow between functions…

In addition, text annotations may be used to document the logic.

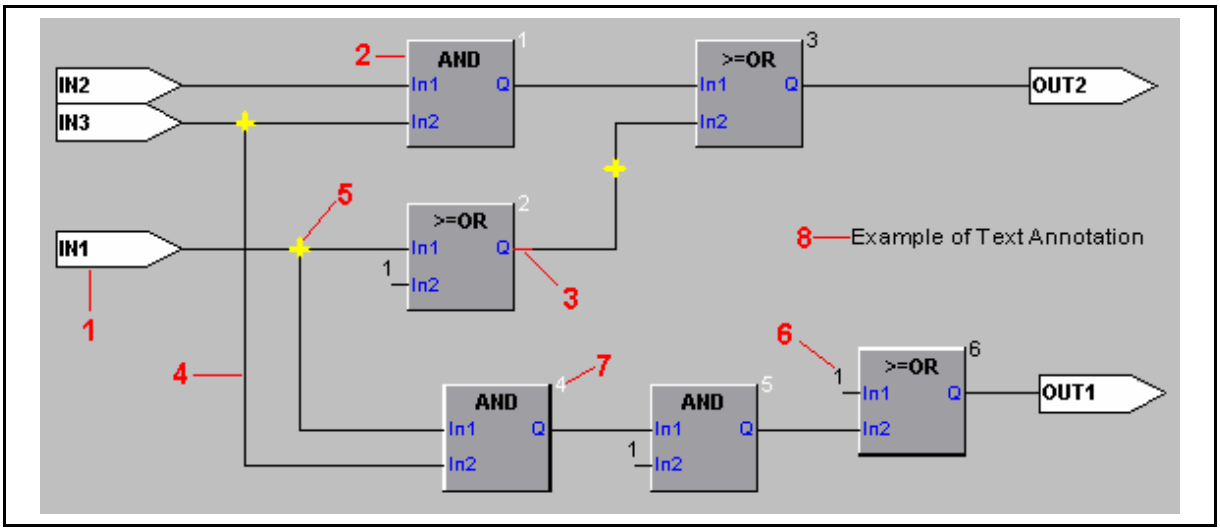
6.3.1 Graphical component on the Editor View

6.3.1.1 Graphical component summary

**FBD Language Elements**
Slots, Functions, Function Blocks, Connecting Lines, Signal Flow Lines, Horizontal/Vertical Connections, Literal

**Annotations**
Text Annotations

6.3.1.2 Properties




(1) **Slots** describe input/output parameters of Functions or Function Blocks.

(2) A **Function or Function Block** is a FBD instruction which, when executed, yields one or more values.

(3) A Function, Function Block or Slot can have one or more **Connecting lines**.

(4) **Signal flow lines** represent the data flow between Blocks: head and tail of a SFL may either be put on a Slot, a Function or Function Block CL or on a H/V C. Only one **Signal Flow Line** may be routed from one connecting line.

(5) A Signal Flow Line may be derived in many locations of its path inserting **Horizontal/Vertical connections** at these locations.
Inserting an H/V C in the SFL path break down this SFL into two new SFL connected to the H/V C. A H/V C may not stay alone on the Editor view.

(6) **Literal** may be used to customize Function or Function Block inputs.

NOTE: For PACiS V3, **only duration literal** is available.

(7) Network **evaluation sequence index** is automatically calculated.

(8) **Text annotations** are useful to the equation.

NOTE: Graphical components can be put anywhere on the FBD Editor view. Graphical overlapping and page boundaries crossing checks are made.
Edition is Language Sensitive and allows only the building of semantically meaningful FBD networks.

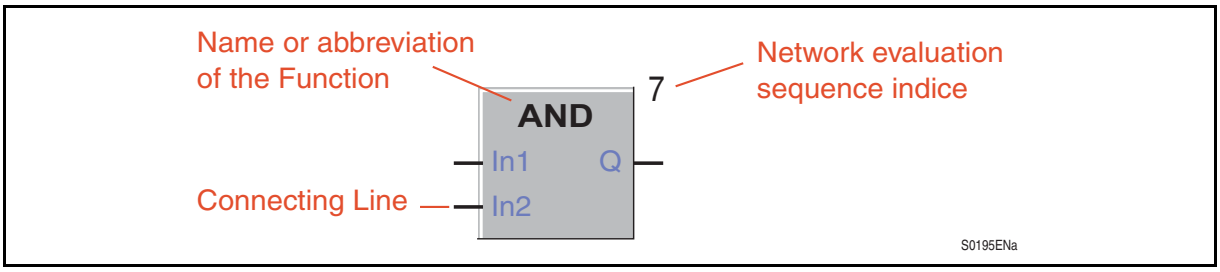
## 6.3.2 Language Elements

### 6.3.2.1 Function (F)

**Definition**: A Function is defined as a FBD instruction which, when executed, yields exactly one data element.

Functions are stateless (invocation of a Function with the same arguments shall always yield the same output value).

**Drawing**: The illustration below shows the features of a Function.




More details

- about Function usages in "Working with Functions and Function Blocks",
- about the Block pop-up menu in "Activity List of Blocks".

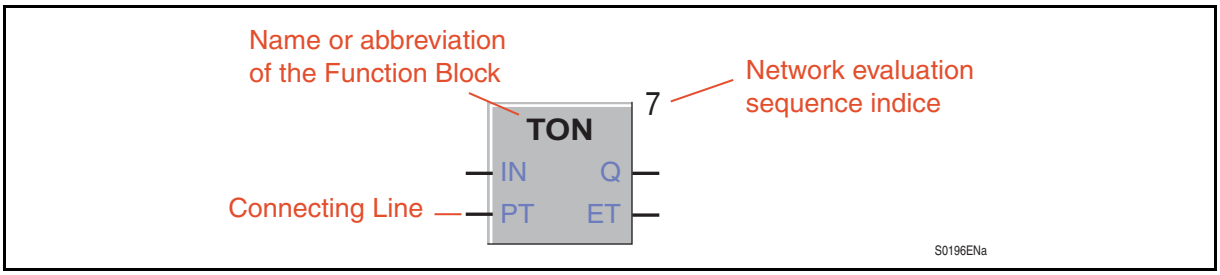
### 6.3.2.2 Function Block (FB)

**Definition**: A Function Block is a FBD instruction which, when executed, **yields one or more values**. Multiple copies, named **instances**, of a Function Block can be created.

All the values of the output parameters and of the internal variables shall persist from one execution of the Function Block to the next ; therefore, invocation of a Function Block with the same arguments needs not always yield the same output values.

Output parameters shall be accessible outside an instance of a Function Block.

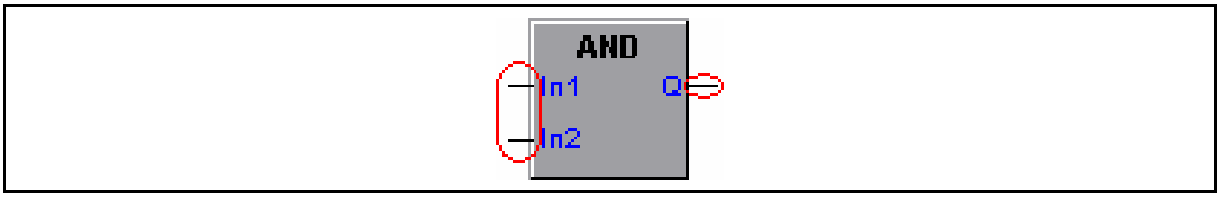
**Drawing**: The illustrations below show the features of a Function-Block




More details

- in "Working with Functions and Function Blocks",
- about Block pop-up menu: "Activity List of Blocks".

6.3.2.3 Connecting Lines (CL)




**Connecting lines** represent graphically the input and output signals of a Function or a Function Block.

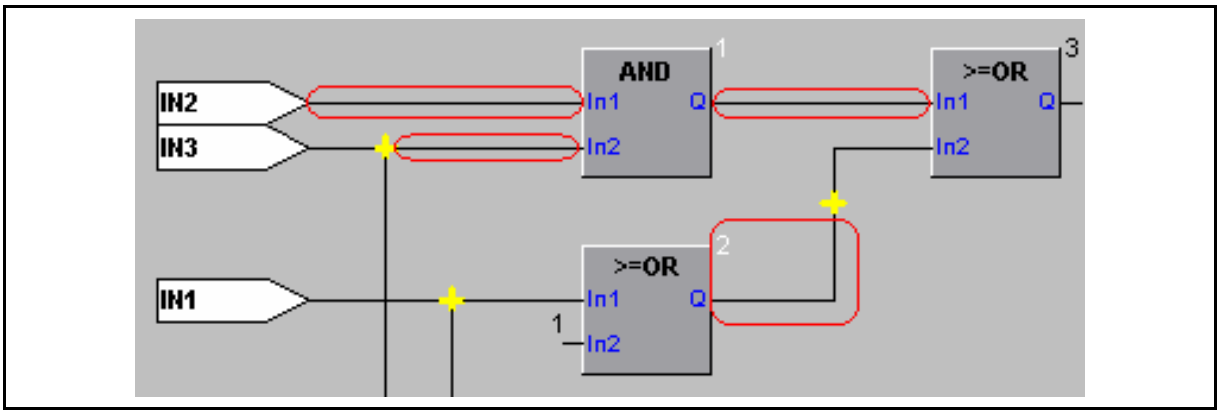
Connecting lines are typed.

Examples: BOOL, TIME

More details

- about the CL usage in "Working with Signal Flow Lines (SFL)" and in "Working with Literals",
- about the CL pop-up menu: "Activity List of Connecting Lines".

6.3.2.4 Signal Flow Lines (SFL)




**Signal flow lines** represent the data flow between Blocks: head and tail of a SFL may either be put on a Slot, a Function or Function Block CL or on a H/V C.

A SFL is **created** by left clicking on a CL or a H/V C without releasing the mouse button, moving the mouse up to reach another CL or H/V C.
Routing is made automatically.
The SFL route can be adjusted translating SFL segments.

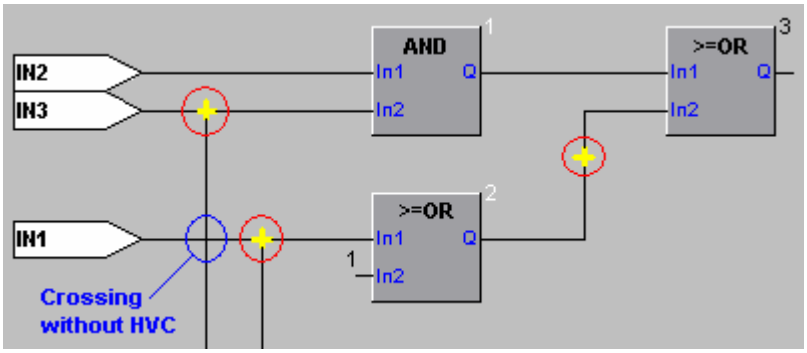
A signal flow line **must be connected on its two extremities** to a Function, Function Block CL or a H/V C.

Head and tail must be connected to CL having the same type and the same variable symbol name. If not, the connection fails.

More details

- about the SFL usage in the chapter "Working with Signal Flow Lines (SFL)",
- about the SFL pop-up menu: "Activity List of Signal Flow Lines".

6.3.2.5 Horizontal/Vertical Connections (H/V C)




**Horizontal/Vertical Connections** represent signal connections between Signal Flow Lines.

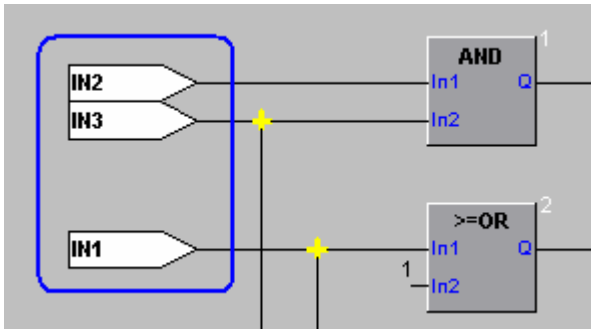
H/V connections allow quick understanding of line crossing with or without connections.

A new H/V connection is added by breaking down a horizontal or vertical signal flow line into two segments and allows the connection of a respectively vertical or horizontal new one. It can also be added at a SFL bend.

More details

- about the H/V C usage in "Working with FBD Network",
- about the H/V C pop-up menu: "Activity List of H/V Connections".

6.3.2.6 Slots

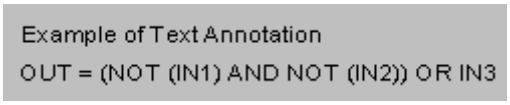



Slots describe the equation input/output parameters defined by PACiS. Therefore, new Slots can not be created.

More details

- about the Slots usage in "Working with Slots",
- about the Slots pop-up menu: "Activity List of Slots".

6.3.3 Text Annotations




**Text annotations** (TA) are used in FBD documents. A Text Annotation is a comment that you can write in the background of the FBD document.

Text annotations may be left anywhere on the edition view sheet except on page boundaries.

For manipulations, see "Working with Text Annotations".

TA pop-up menu is described in "Activity List of Text Annotations".

6.3.4 Evaluation strategy

In a FBD document, each Function Block is marked with an execution order number. **FBD editor** gives itself all the sequence indexes to all the F and FB.

This number is called **"Network evaluation sequence index"** and is automatically calculated (see description of "Function (F").

This **automatic calculation** is founded upon the IEC standard. The most important rule of the IEC standard is the obligation to evaluate at once, all the FB linked with the input Connecting Lines of the current FB to evaluate.

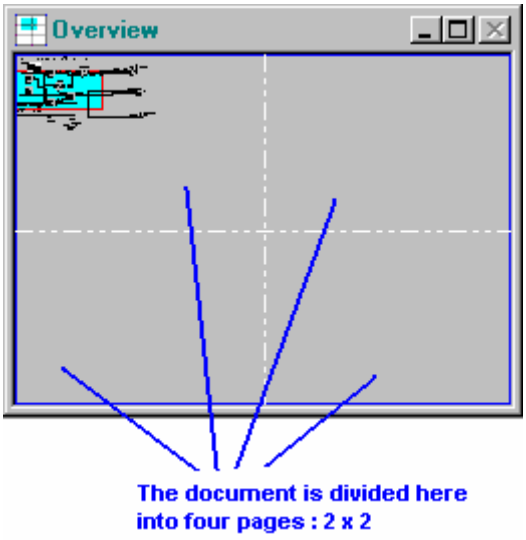
## 6.4 Working with the Equation Viewer

6.4.1 FBD document

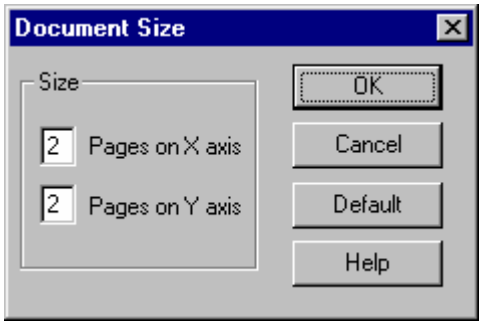
**A FBD Document** gathers a lot of FBD networks needed to achieve equations.

The whole document is visible in the Overview.

The document is divided into **pages** that are delimited by dashed lines (page boundaries) in the Overview and in the Editor view.




Page ranges on X and Y are from 1 to 4 allowing a maximum matrix of 12 pages (3*4/2*6).




The document control panel allows resizing the FBD document matrix by specifying the number of pages.

NOTE: It is impossible to reduce a document size if it involves the removing of non-empty pages: it is necessary to delete or move these FBD networks before.

### 6.4.2 Navigation Features

There are different ways to change the Editor view content, from the Editor view itself or from the Overview:

To shift the view with a smooth scroll

Using **arrow keyboard interface**: ← ↑ → ↓

Using the **mouse**: left-clicking on the vertical/horizontal scroll bars arrows

To shift the view by a half page

Using **arrow keyboard interface**: Ctrl← Ctrl↑ Ctrl→ Ctrl↓

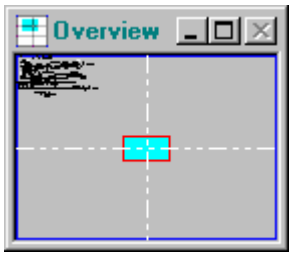
Using the **mouse**: left-clicking on the free part of the scroll bar

To shift the view by an entire page

Using keyboard interface: buttons Page-Up and Page-Down

Using the **mouse**: left-clicking on the blue rectangle and moving it up to the next page

To shift the view in the middle of the document




Using **keyboard interface**: button **5** of the keypad in **Num Lock** position

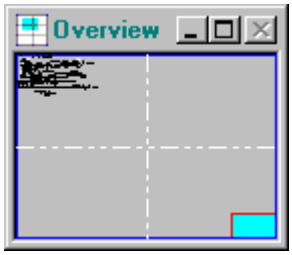
Using the **mouse**: left-clicking on the blue rectangle and moving it up to the middle

To shift the view at the beginning and at the end of the document

Using keyboard interface:

Button **Home**: the blue rectangle goes to the top left corner of the document overview.

Button **End**: the blue rectangle goes to the bottom right corner of the document overview.




Using the **mouse**: left-clicking on the blue rectangle and moving it up to the top left corner or the bottom right corner of the document

In all cases with the mouse

You can shift the view anywhere by left clicking on the blue rectangle and move it where you want in the document, keeping the left click on.

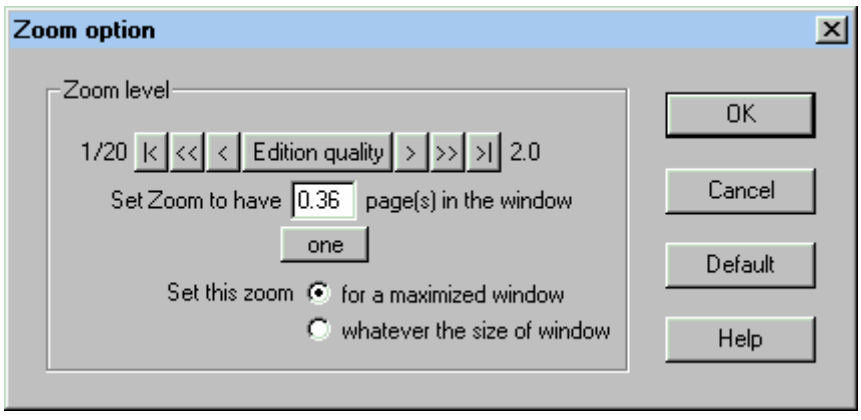
You can click anywhere in the document Overview window and the blue rectangle comes where you have clicked.

### 6.4.3 Zoom Features

It is possible to adjust the Zoom level of the Editor view in order to have the best compromise between the amount of information displayed and their readability.

Edition is possible for any Zoom ratio.

For example: working with a high Zoom ratio is useful for structural operation (subnetwork duplication,...)




The Zoom unit is a **page.**

The Zoom **minimum value** is 1/120th of a page.

The Zoom **maximum value** is the page number fixed by the user (see "FBD document").

The current Zoom value is displayed in the edit field.

There are different means to modify the Zoom ratio:

The arrows and double arrows are used to modify Zoom more precisely.
< and > modify the Zoom ratio of a tenth (1/10) of a page.
<< and >> modify the Zoom ratio of a half page.
|< and >| set the minimum and maximum Zoom ratio.

"Edition quality" sets the Zoom ratio to have the best readability of Blocks and comments on the chosen view. The **Default** button has the same behaviour.

The "one" button sets the Zoom ratio to "one page per view".

If you have chosen to work with the Zoom ratio set for a maximized window:
You have to select the option "for a maximized window" like in the example above.
In this case you can also modify the Zoom ratio by moving the blue rectangle in the Overview.
If you modify the Editor window size, the Zoom ratio stays the same and more or less FBD logic is visible.

If you have chosen to work with whatever size of window:
You have to select "whatever size of the window".
In this case, it is not possible to modify the Zoom ratio by the overview.
If you modify the Editor view size, the same content will be displayed with another Zoom ratio.

### 6.4.4 Selection Model

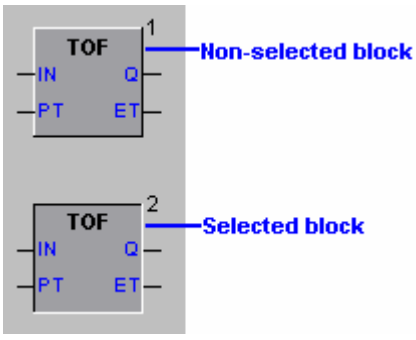
#### 6.4.4.1 Selection of a graphical component

All graphical components may be individually selected by a left-click or by a right click. In the second case, a pop-up activity list is also displayed.

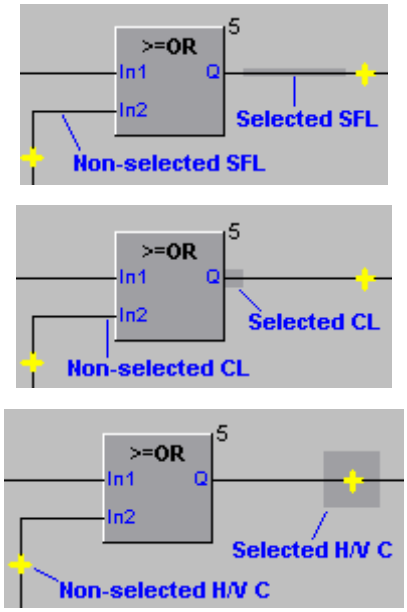
A. In response to this explicit selection, a selection feedback is provided.

**Slot**: the border becomes blue.

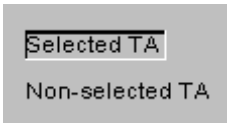
**F & FB**: the border colours are reversed.




**SFL, CL & H/V C**: a gray border is displayed around the graphical component.




**TA**: the text is displayed in embedded form.




B. To cancel the selection

Any left click on the background cancels previous selection.

Any left click on another graphical component selects this one cancelling the previous selection.

**Ctrl** key + left click.

C. Actions on the selected component

Depending on the selected component, some actions are or are not allowed.

Example: Cut or Copy are not allowed on a SFL.

Depending on the selected component and the action, some non-explicitly selected graphical components may be affected and no feedback is provided for them.
Effects of this kind of selection is indicated in another way.

Example: CL are moved and SFL are re-routed when moving a selected function block.

WYSIWYG (What You See Is What You Get) effect is provided during Move/Copy operations: dashed graphical components represent the operation result at the drop time.

More Details

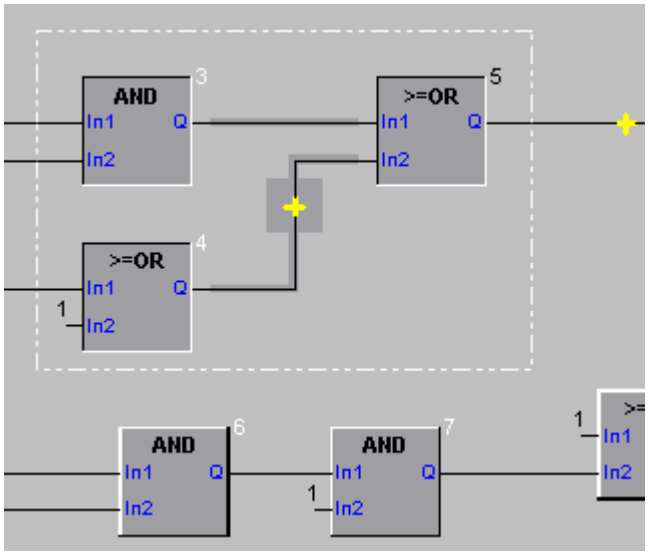
See "Block manipulation" or "Move/Copy-Paste/Cut-Paste operation for Network region".

6.4.4.2 Selection of a subnetwork

A subnetwork is a set of graphical components that have a functional meaning.

A. To select a subnetwork

A subnetwork can be selected drawing a focus rectangle around it:
you left-click anywhere in the document and with the mouse button maintained on, you fully surround all the components you want in the subnetwork (the focus rectangle is composed of dashed lines).




For each graphical component fully included inside the focus rectangle, a selection feedback is provided as described in "Selection of a graphical component".

B. To aggregate several objects

You select the first object by a left click and for the others, you use the left click with the Ctrl key pushed on. All these not contiguous objects create a set that can be copied, cut or deleted as the subnetwork described below.

C. To aggregate several subnetworks

You can also add a new subnetwork to the previous selection set by drawing a focus rectangle (as above) around this new subnetwork while pressing the Ctrl key.

D. To cancel the selection:

Any left click on the background cancels the previous selection.

Any left click on another graphical component selects this one cancelling the previous selection.

**Ctrl** key + left click.

**Ctrl** key + a focus rectangle to cancel a part of the selection.

E. Actions on the selected subnetwork

See "Working with FBD Network".

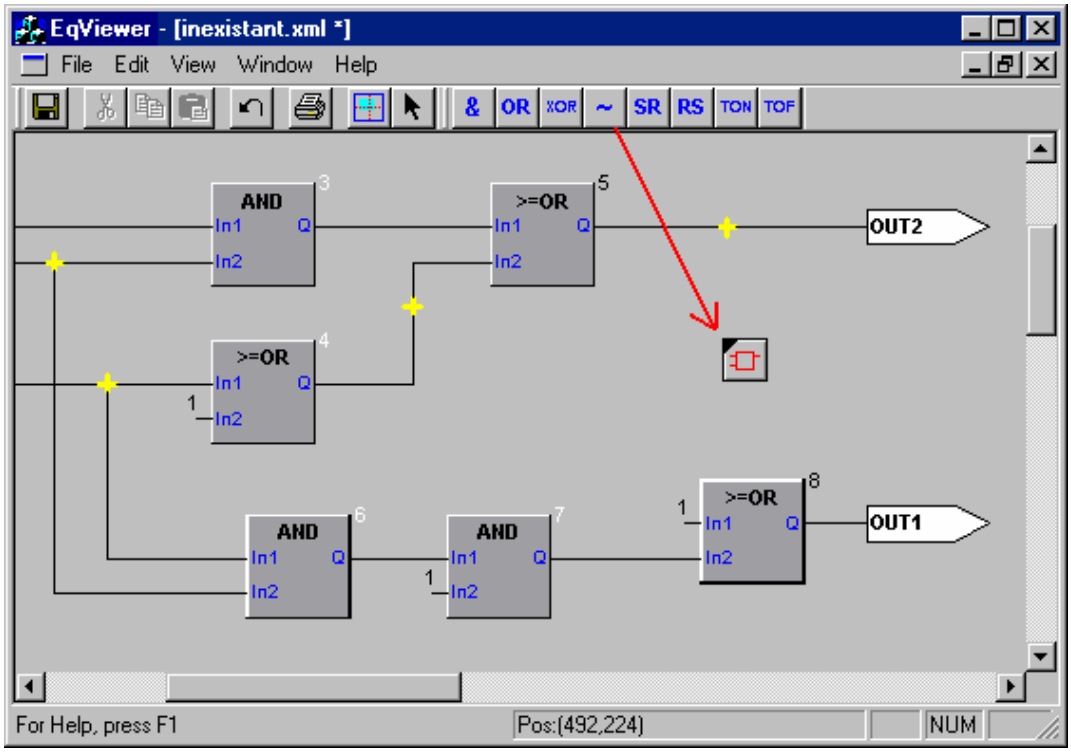
WYSIWYG effect is available as described in "Selection of a graphical component".

### 6.4.5 Working with Functions and Function Blocks

#### 6.4.5.1 How to get a Block

To add a FBD Block, choose the block by left clicking on the corresponding button in the FBD toolbar and place it in the document by left clicking in the FBD View where it must be placed.

After the selection of the block, the cursor (usually an arrow) is replaced by a cursor representing the block.




When the block is added to the document, it can be moved or duplicated by traditional drag and drop operations.

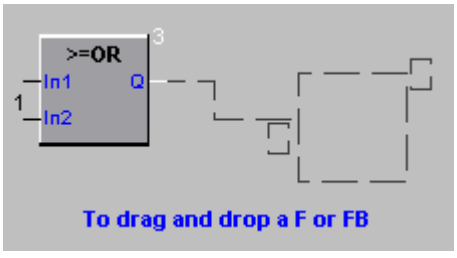
#### 6.4.5.2 Block manipulation

A right-click on a Block selects it and also displays a pop-up activity list whose items are explained below; then it becomes possible to do some manipulations with the selected Instruction.

To move a Block

You select the chosen block and you move the mouse with the left-click on (drag and drop operation).

The borders are then drawn in dashed lines as the linked SFL which stay attached and are automatically rerouted.




The drawing stays with dashed lines until you drop the left-click. The instruction is then re-drawn in its new location.

Cut and paste operations

You select the chosen block.

You push on **Ctrl+X or**
you select the **"Cut"** item in the Edit menu **or**
you select the **"Cut"** item in the pop-up menu (right click).

You left-click at any location of the Editor view.

You push on **Ctrl+V or**
you select the **"Paste"** item in the Edit menu **or**
you select the **"Paste"** item in the Editor view pop-up menu (right click).

NOTE: By cut and paste, both source and target networks are modified; the Instruction loses its connected SFL lines.

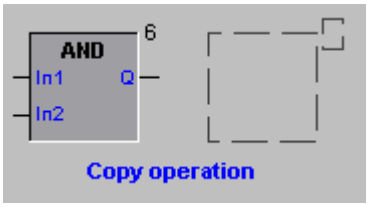
To duplicate a Block

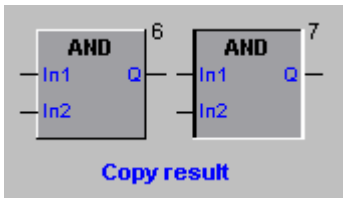
* Drag and drop operation

You select the chosen block by a left-click.

You move the mouse with the left click on and while pushing on the Ctrl key. The new F or FB is copied without its connected SFL lines and is drawn in dashed lines (as above).

The drawing stays with dashed lines until you drop the left-click. The new block is then drawn in the current place.




or

* Copy and paste operations

You select the chosen F or FB

You push on Ctrl+C *or*
you select the "Copy" item in the Edit menu *or*
you select the "Copy" item in the pop-up menu (right click)

You left click at any location of the Editor view.

You push on Ctrl+V *or*
you select the "Paste" item in the Edit menu *or*
you select the "Paste" item in the Editor view pop-up menu (right click)
(copy is also made without SFL lines).

NOTE: If you drop/copy on a wrong area, the element remains displayed dashed red. It is now possible to initiate a new drag&drop/copy operation in order to move the element in a right area.

To delete a F or FB

You select the chosen Instruction and then you have four possibilities:

to push on the **"Delete"** key: the Instruction is definitely deleted.

to push on **Ctrl+X**: **"Cut"** operation without following **"Paste"**.

to select the wanted operation in the Edit menu: **"Cut"** or **"Delete"**.

to select the **"Delete"** item in the pop-up menu (right click).

6.4.5.3 Extensibility

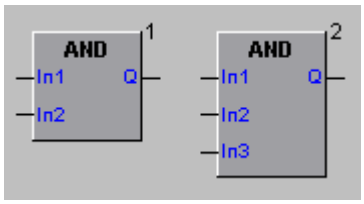
Extensibility is supported on some Boolean operators. This means that you can extend the number of input CL of a block by duplicating the last one.

The manipulation is simple:

You select the input CL you want to duplicate.

You select the **Duplicate** item in the pop-up menu of the CL.

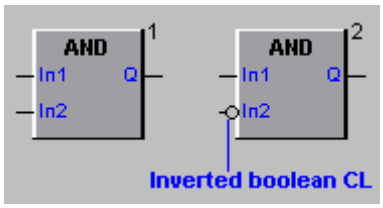
The new input CL is created, with the same attributes than the duplicated one.




You can delete a duplicated input CL by using the **Delete CL** item in the CL pop-up menu.

6.4.5.4 Negation

It is possible to negate an input or output Boolean CL, by using the **Toggle Negation** item in the pop-up menu of the CL.




This item will obviously toggle the negation on and off.

6.4.5.5 How to get Help about a Block

The on-line help may be launched (**F1 key**) from any FBD block of the FBD View.

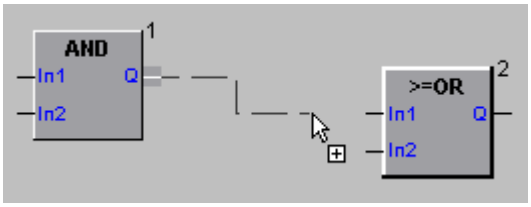
6.4.6 Working with Signal Flow Lines (SFL)

6.4.6.1 SFL manipulation

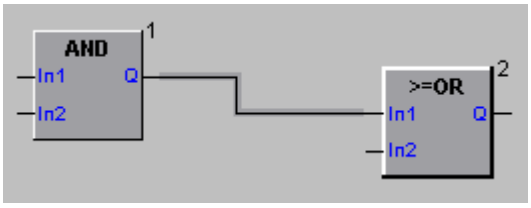
To draw a SFL from a F or FB to another one

You left click on the chosen CL of the original F or FB: it initiates a new “Signal Flow Lines (SFL)” routing; the feedback is the CL becomes white.

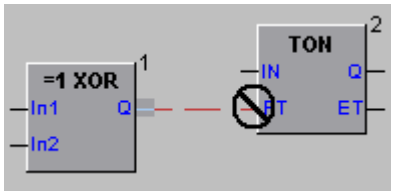
You move the cursor until the CL of the ending F or FB (with the left click pushed on); the SFL is drawing in dashed line(s).




You push off the left click when the cursor is on the destination CL; the SFL is now drawn in continuous lines and in selected mode.




NOTE: Head and Tail must be connected to CL having the same type. In this case the feedback is a white dashed SFL.
If not, an error is displayed by a red dashed line feedback and a "not entry" sign.




Information about "Literal manipulation (Paste/Delete/Cut/Copy".

To perform a SFL Routing

Each time a SFL routing is necessary, it is made automatically but roughly.

It is efficient enough for the most frequently operations made on networks.

Meanwhile, the SFL route can be adjusted translating segments:

You select the SFL segment left clicking it.

You keep the left click and move the mouse until having the right routing.
The SFL is drawn in dashed lines during the operation.

You release the left click to have the final route. The SFL is then drawn in continuous lines.

To delete a SFL

You select the chosen SFL and then:

You push on the **"Delete"** key **or**

You select the item **"Delete SFL"** of the pop-up activity list (right click) **or**

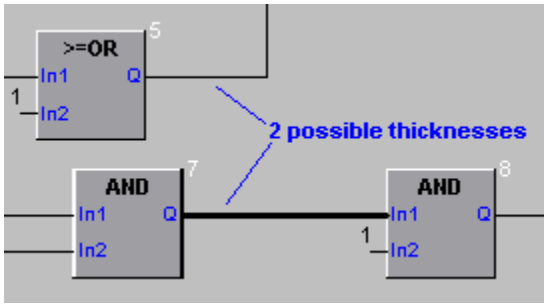
You select the **"Delete"** operation in the Edit menu

**Then** SFL is definitely deleted,

To choose the SFL thickness

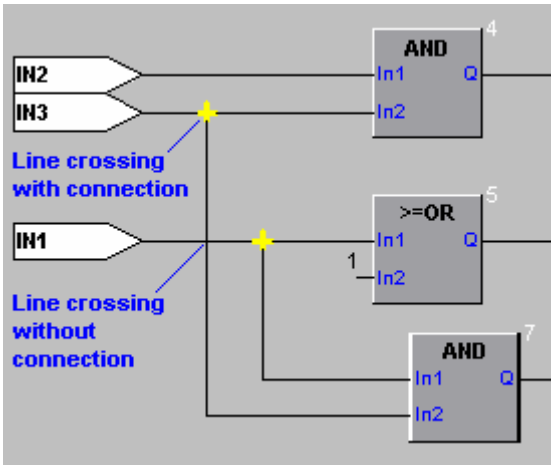
You can change the SFL drawing thickness by the **"Toggle thickness"** option of the SFL pop-up activity list (right click).

The result is showed below:




6.4.6.2 SFL derivation: H/V C

A H/V C connection breaks down an horizontal or vertical Signal Flow Line into two segments and allows connection of respectively vertical or horizontal new one. It allows quick understanding of line crossing with or without connections.




To **insert** a Horizontal/Vertical Connection in a SFL, you have to do the following actions:

You select the **SFL** where you want insert a H/V C.

You right-click with the mouse and a pop-up activity list is displayed.

You select the item "Insert H/V C" and the H/V C symbol is displayed at the cursor location on the SFL drawing.

To **delete** a Horizontal/Vertical Connection, you have to do the following actions:

You select the **H/V C**.

You right-click with the mouse and a pop-up activity list is displayed.

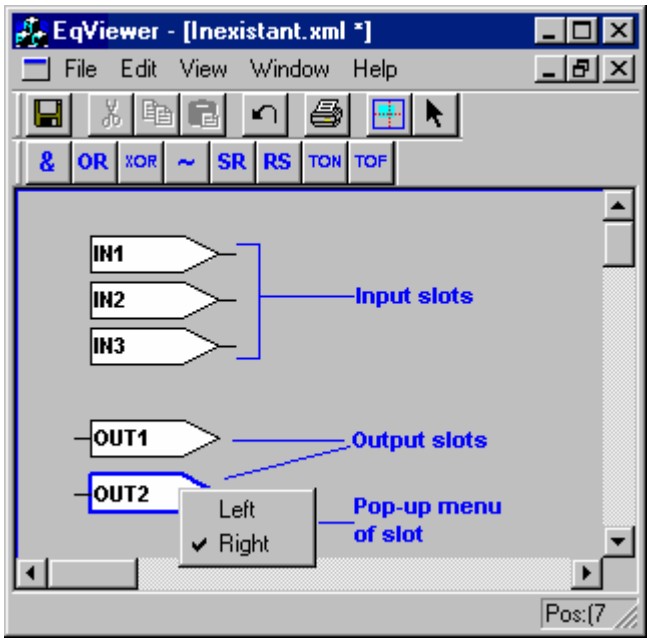
You select the item
**"Delete H/V C & SFL"**: the selected H/V C and all the SFL linked to are deleted.
**"Delete H/V C, SFL & symbol"**: the selected H/V C, all the SFL connected to and the corresponding symbol are deleted.

### 6.4.7 Working with Slots

Slots are graphical FBD elements representing input/output list.

That list is written in the XML input file by the PACiS Environment before the calling of the Equation Viewer application.

Slots are represented as shown below:

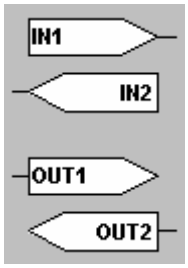



Each slot has a Connecting Line that is a link between:

an input slot and the input of a block or function block (SFL).

an output of a block or function block and an output slot (SFL).

The orientation of the Slots can be toggled thanks to the **Left** and **Right** items of their pop-up menu.



6.4.8 Working with FBD Network

6.4.8.1 Move/Copy-Paste/Cut-Paste operation for Network region

The general mechanism is quite the same using clipboard or drag and drop facilities:

Select a network region on the Editor view
(see "Selection of a subnetwork").

Initiate a Cut-Paste/Copy-Paste or drag and drop operation.

Terminate this operation either by cancelling it or by entering it (you can stop the operation by pushing on the **Esc** key or by dropping in a "no entry" area).

To move a network region

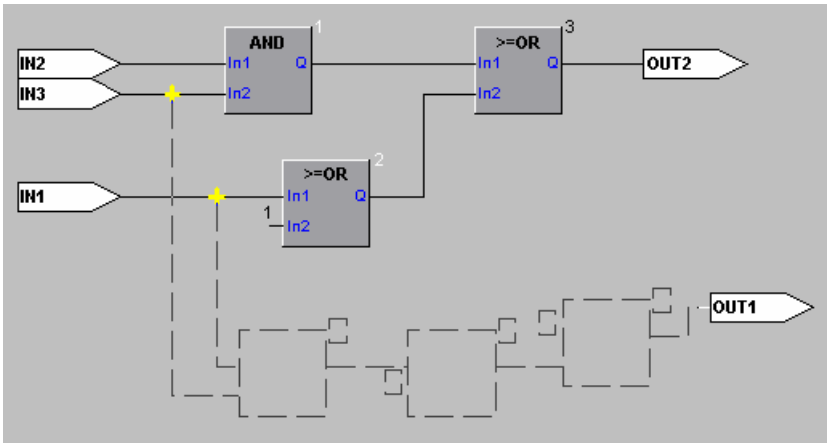
* Drag and drop operation

You select the network.

You left click on one of selected objects.

You move the mouse with the left-click on.

The borders are then drawn in dashed lines as the linked SFL which stay attached and are automatically rerouted.




The drawing stays with dashed lines until you drop .The subnetwork is then re-drawn in its new location.

or

* Cut and paste operations

You select the subnetwork.

You push on **Ctrl+X** or select the **"Cut"** item in the Edit menu.

You move the cursor where you want in the Editor window and left-click on.

You push on **Ctrl+V** or select the **"Paste"** item in the Edit menu.

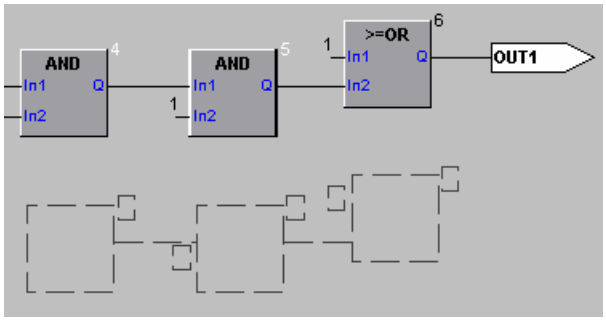
NOTE: Connexion (SFL) between the cut subnetwork and the remaining network are lost.

To duplicate a subnetwork

* Drag and drop operations

You select the subnetwork and you move the mouse with the **Ctrl** key pressed.
The new subnetwork loses all its connected SFL lines with the remaining network .
It is drawn in dashed lines (as below). The draw stays with dashed lines until you drop (WYSIWYG effect).

The new instruction is then drawn in continuous lines at the current place.




During the copy operation, the subnetwork is displayed red as long as it is in a wrong area.

or

* Copy and paste operations

You select the subnetwork.

You push on **Ctrl+C** or select the **"Copy"** item in the Edit menu.

You move the cursor where you want in the Editor window and left-click on.

You push on **Ctrl+V** or select the **"Paste"** item in the Edit menu
(SFL lines are lost).

NOTE: If you drop/copy on a **wrong area**, the subnetwork remains displayed dashed red.
It is now possible to initiate a new drag&drop/copy operation in order to move the subnetwork in a right area.

To delete a subnetwork:

You select the subnetwork and then you have three possibilities:

To push on the **"Delete"** key: subnetwork is definitely deleted.

To push on **Ctrl+X**: "Cut" operation.

To select the wanted operation in the **Edit** menu: "**Cut**" or "**Delete**".

6.4.8.2 Working with several Editor Views

When you are working in a document, you can probably have to move or copy a Block or a subnetwork from a document area to another or to draw a SFL from a Block to another.

If the two areas or blocks are not visible in the same view, you have two solutions:

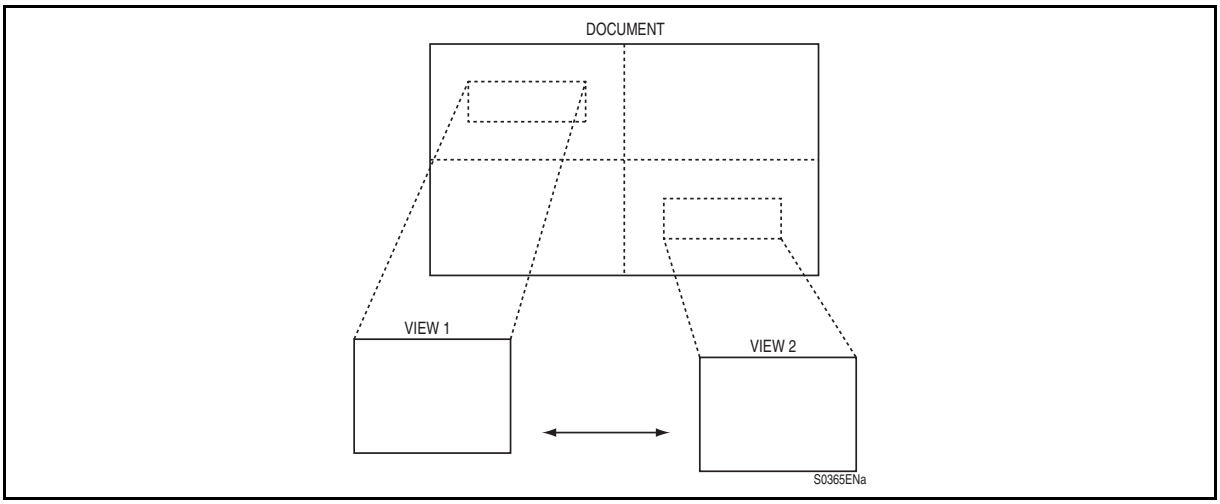
1. You can perform a drag-scroll through the document with the drawback of not seeing the beginning AND the end of your operation at the same time.

2. You can open another view of the same document:

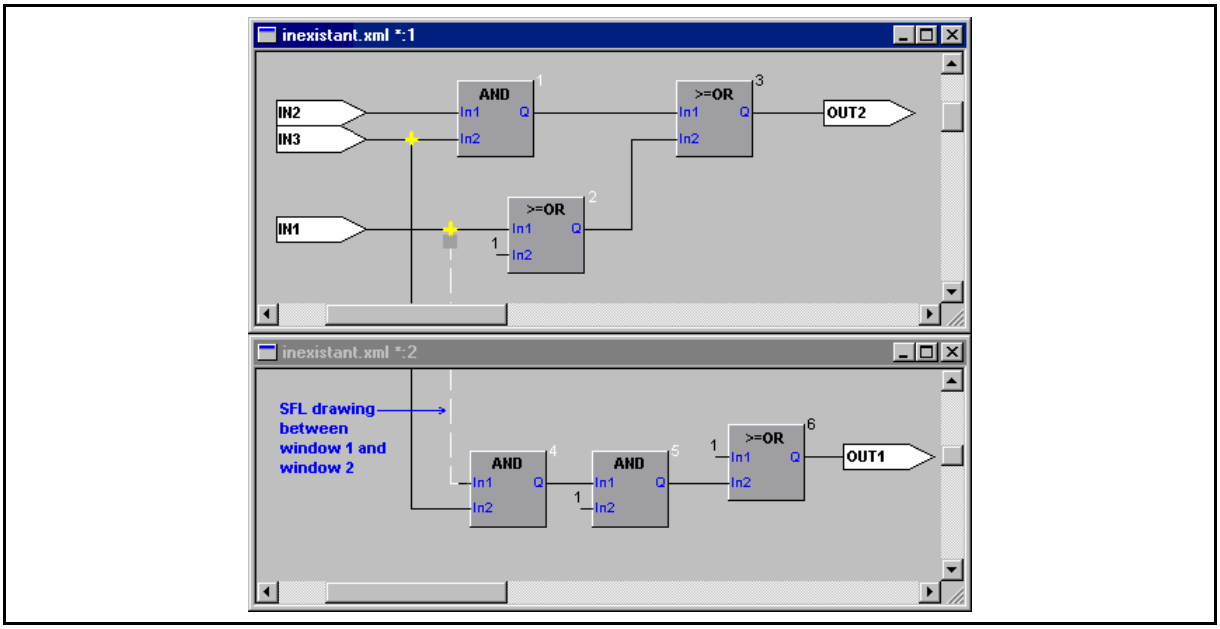
At the main toolbar, you select the "New Window" item of the "Window" menu.

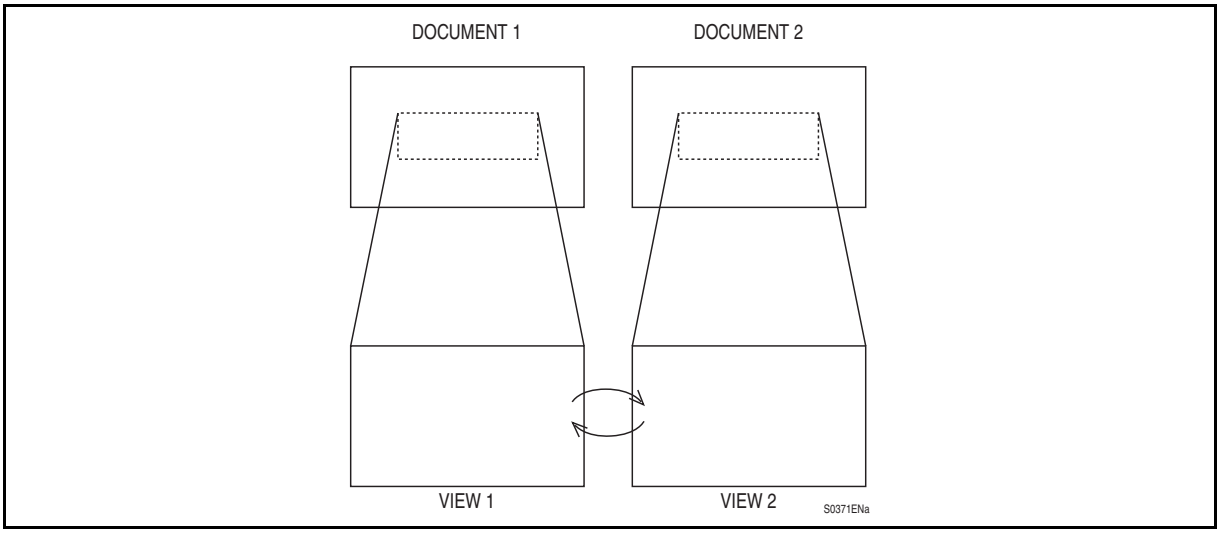
A second window of the same document is opened and is independent of the first one.

You can choose different Zoom ratios, focus on different document areas, ...




Now, it is possible to perform drag and drop, SFL drawing, ... from one view to the other but in the same document and seeing the two views at the same time.




NOTE: The sequence indice is automatically modified, adapted to the new network. SFL connections are not allowed between different documents.

### 6.4.9 FBD Graphical Controls

You cannot put FBD graphical elements anywhere in the Editor Window:

not on or quite near a Block or a Text Annotation,

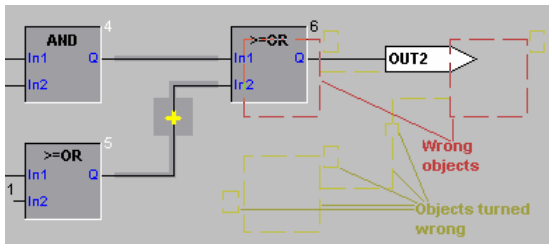
not on the page boundaries.

In these cases, FBD returns a feedback to show the problem:

RED dashed lines to indicate what draw part is in a forbidden zone, with a "no entry" ⊘ sign.

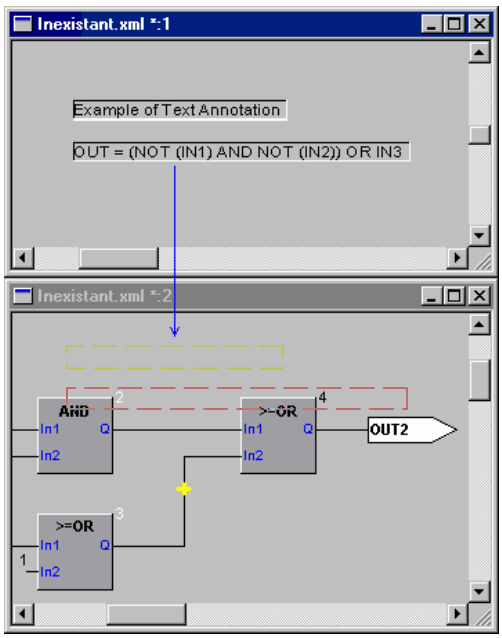
YELLOW dashed lines to indicate the objects which becomes unacceptable because of the attached wrong (RED) object.

Example 1: MOVE operation




During the Move operation, these colours (red and yellow) are displayed as long as the moved object is in a wrong area. If you drop in a wrong situation, the drawing is like before the move operation and the colour dashed lines are removed.

Example 2: Copy/Paste between two Editor windows




During the Copy operation, the graphical element is displayed red as long as it is in a wrong area. If you drop it on this wrong area, the element remains displayed dashed red. It is now possible to initiate a new drag & drop operation in order to move it on a right area.

### 6.4.10 FBD Semantical Controls

#### 6.4.10.1 Prototypical FBD network notion

In the description of a Function or a Function Block, each connecting line has definite characteristics which fix the data types choice possibilities for each of them.

The Equation Viewer controls that the edited variable meets the CL criteria.

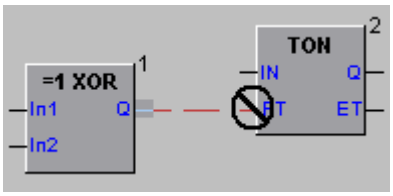
Connecting Lines prototypes are characterized by Data type. A CL can accept variables of one or several data types (ex: Bool, Time, ...). Supported data types depend on target types.

Two CL of two F or FB which has to be linked by an SFL must have compatible data types ; if not, the Equation Viewer doesn't allow the SFL drawing as explained in "Prototypical Controls".

#### 6.4.10.2 Prototypical Controls

The Equation Viewer controls that two linked CL have compatible characteristics.

Example with no compatible data type: Error feedback




### 6.4.11 Working with Literals

The Equation Viewer allows the creation of boolean and duration literals. For PACiS V3, only duration literal are available.

When assigning a literal, users will be prompted to enter its value:

**Duration**:
duration::= (T| t )#[-]) interval
interval::= days| hours | minutes | seconds | milliseconds
fixed_point::= integer[.integer]
days:: = Fixed_Point ( d |D)
hours:: = Fixed_Point ( h | H)
minutes:: = Fixed_Point ( m | M)
seconds::= Fixed_Point (s | S)
milliseconds::= Fixed_Point (ms | MS)

**Example:** T#100ms, t#10H30m15s

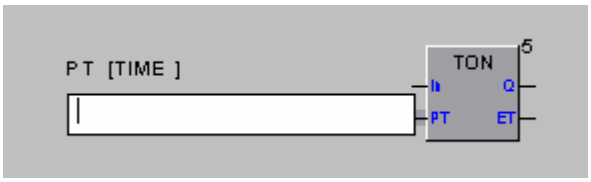
When the user assigns a literal to a function or function block input parameter, checks are made in order to evaluate if the data type complies with this one expected on this parameter.

If not, the assignment will fail.

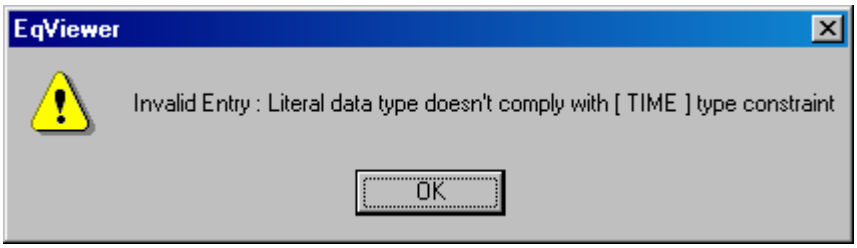
6.4.11.1 Associate Symbol

You double click the left-hand mouse button on the **CL** or you click the right-hand mouse button and select the **Associate symbol** item in the activity list of a **SFL**, a **CL** or a **H/V C**.

An edit field is then opened where you can type the literal you wish to associate to the CL. Near the name of the CL, you can see in square brackets the data types which can be associated.




As we enter a literal which does not match with the duration type constraint, we obtain the following error message:




As the right literal is in the field, press the Enter key of your keyboard. The literal is then associated to the CL and an edit field is automatically shifted to the next CL to define (if there is one…).

6.4.11.2 Literal manipulation (Paste/Delete/Cut/Copy

To move a literal

Drag and drop operation

Initially, the literals are put around the F or the FB, but they may be moved anywhere on the sheet according graphical and semantic control:

Select the literal by clicking the left mouse button.

You can then move the literal by maintaining the left mouse button clicked on, up to another place (drag and drop operation).

Cut and paste operations

Select the chosen literal.

Press **Ctrl+X,**
or
Select the Cut item in the Main Edit menu,
or
Select the Cut symbol item in the literal pop-up activity list (click the right mouse button on the literal.

Move the cursor to another CL, SFL or H/V C in the Editor window and click the left mouse button on it.

Press **Ctrl+V**,
or
Select the **Paste** item in the Edit menu,
or
Select the **Paste** symbol item in the CL or SFL or H/V C pop-up activity list.

Arrange symbol

**Arrange symbol** is an operation of the pop-up activity list obtained by clicking the right mouse button on an F or an FB.

The result is a display in normal form and near the current F or FB, at the **initial position** of the symbol.

To duplicate a literal

Drag-and-drop operation:

Select the chosen literal.

Move the mouse with the left mouse button clicked on and while pressing the Ctrl key.

The drawing stays within dashed lines until you drop. The new literal is then drawn in the current place.

Copy and paste operations:

Select the chosen literal.

Press **Ctrl+C**,
or
Select the **Copy** item in the **Edit** menu,
or
Select the **Copy symbol** item in the literal pop-up activity list (click the RH mouse button on literal).

Move the cursor to another CL, SFL or H/V C in the Editor window and click the left mouse button on it.

Press **Ctrl+V**,
or
Select the **Paste** item in the Edit menu,
or
Select the **Paste symbol** item in the CL or SFL or H/V C pop-up activity list.

To remove a literal assignment

Select the chosen literal ; then you have several possibilities:

- to press the Delete key: the literal is definitely deleted,
- to press Ctrl+X (cut operation),
- to select the desired operation in the Edit menu: Cut or Delete,
- to select the Delete symbol item in the literal, CL or H/V C pop-up activity list.

6.4.11.3 Literal controls

If you try to move or copy a literal on a CL which has not the same type

or

If you try to move or copy a literal:

on or quite near an F or FB,

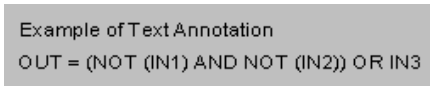
on or quite near an annotation (TA),

on the window boundaries,

between two equation logics,

the Equation Viewer gives you a feedback as below: the literal is displayed in red dashed line with the "no entry" sign and when you release the left mouse button, the literal stays at its initial position.

6.4.12 Working with Text Annotations




6.4.12.1 Creation of TA

You right click on the Editor view background. An activity list is displayed.

You select the option "**Insert Text Annotation**" and an Edit field is displayed at the left-top of the active view, where you can enter your text.

You move by drag & drop the entered text at the location you want in the active view or in another view.

6.4.12.2 Manipulations of Text Annotation

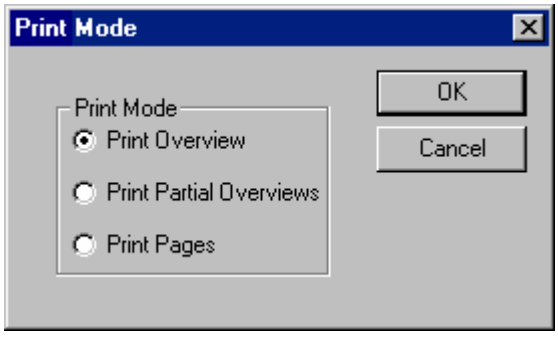
These manipulations are the same as those described in "Literal manipulation (Paste/Delete/Cut/Copy" and as the use of the **Paste** option in the Activity List of the Editor View.

In order to modify a TA, you have to double-click on the TA and an Edit field appears which is initialized by the current TA. It is so possible to modify it.

## 6.5 Printing FBD Documents

**Print**, **Print Preview** and **Print Setup** features will be provided in order to allow printing of documents.

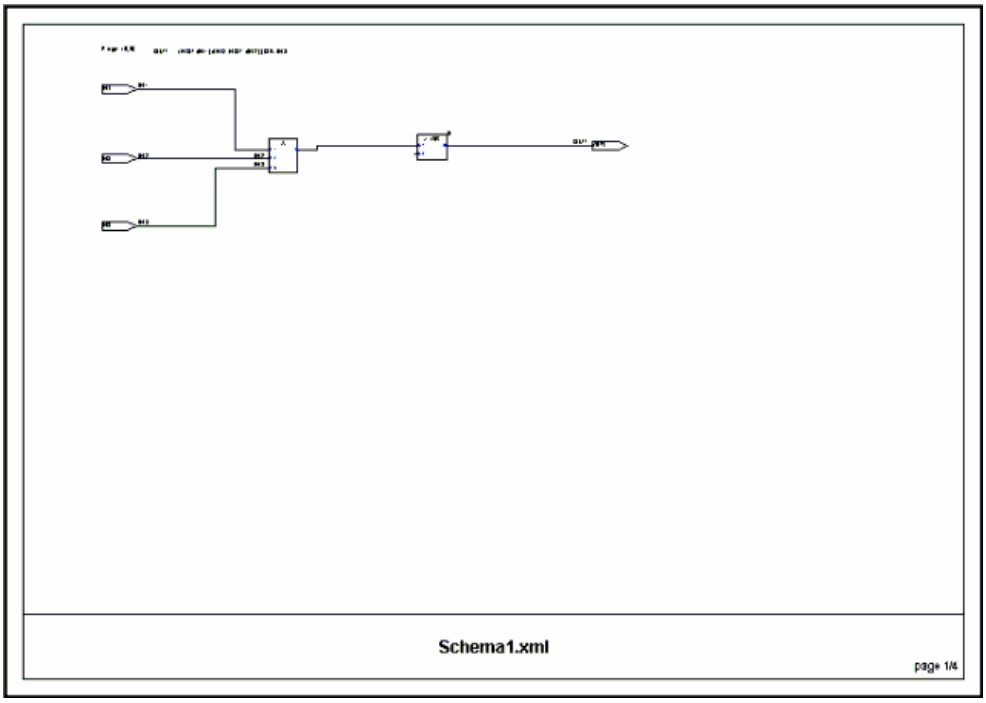
When printing a document, a **Print Mode** dialog prompts user to choose one of the following topics:




**Print Overview**
To print the whole document into one sheet of paper

**Print Partial Overviews**
To print as many sheet as there are matrix of 4x4 pages into the equation logic

**Print Pages**
To print as many sheet as there are pages in the document




## 6.6 Popup Activity Lists

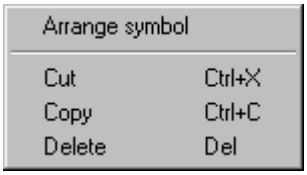
### 6.6.1 Activity List of the Editor View

**Paste**: Displays in the Editor View what has been stored by a **Cut** or a **Copy** instruction

**Undo**: Cancels the last operation

**Insert Test Annotation**: "Working with Text Annotations".

### 6.6.2 Activity List of Blocks



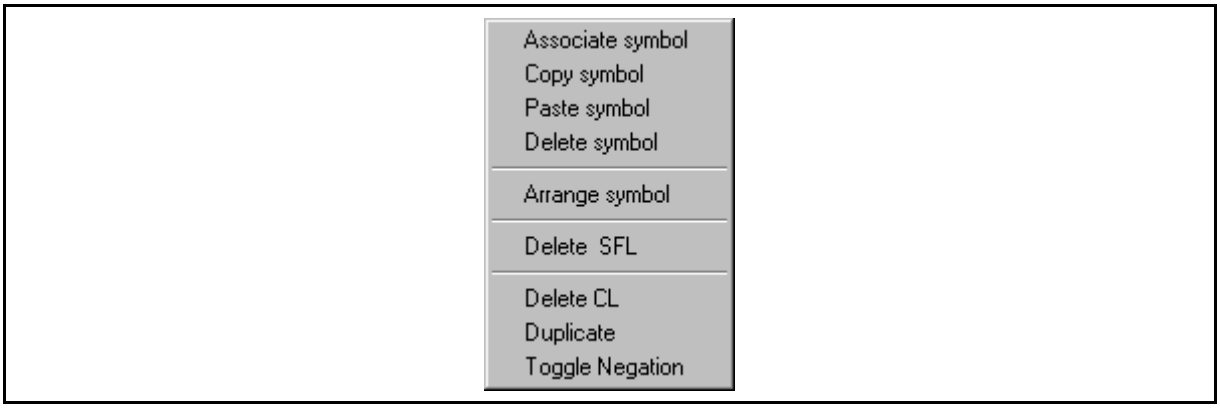

**Arrange symbol**: "Literal manipulation (Paste/Delete/Cut/Copy"

**Cut/Copy/Delete**: "Literal manipulation (Paste/Delete/Cut/Copy"

### 6.6.3 Activity List of Slots

**Left/Right**: "Working with Slots".

6.6.4 Activity List of Connecting Lines




**Associate symbol**: "Working with Literals"

**Paste symbol/Delete symbol**: "Literal manipulation (Paste/Delete/Cut/Copy"

**Arrange symbol**: "Literal manipulation (Paste/Delete/Cut/Copy"

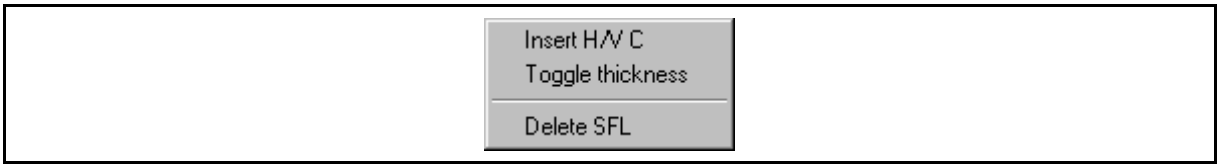
**Delete SFL/Delete SFL & symbol**: "SFL manipulation"

**Delete CL**: "Extensibility"

**Duplicate**: "Extensibility"

**Toggle negation**: "Negation"

6.6.5 Activity List of Signal Flow Lines

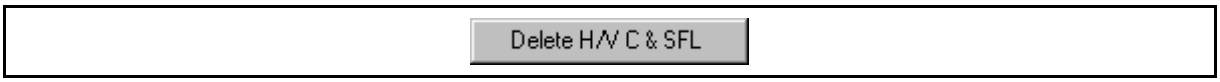



**Insert H/V C**: "SFL derivation: H/V C"

**Toggle thickness**: "SFL manipulation"

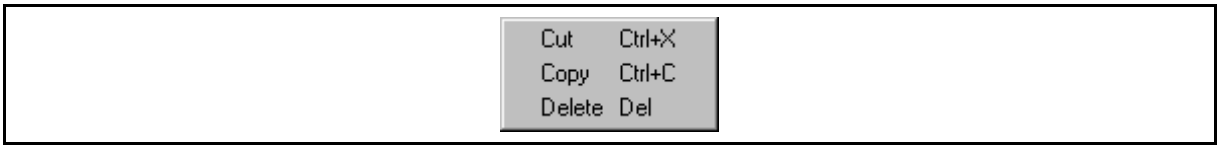
**Delete SFL**: "SFL manipulation"

6.6.6 Activity List of H/V Connections



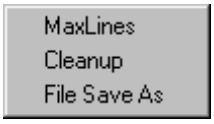

**Delete H/V C & SFL**: "SFL derivation: H/V C"

6.6.7 Activity List of Text Annotations




**Cut/Copy/Delete**: "Manipulations of Text Annotation"

### 6.6.8 Activity List of the Logging View




**MaxLines**: "Logging View"

**Cleanup**: "Logging View"

**File Save As**: "Logging View"

# APPLICATION

# CONTENT

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# 1. SCOPE OF THE DOCUMENT

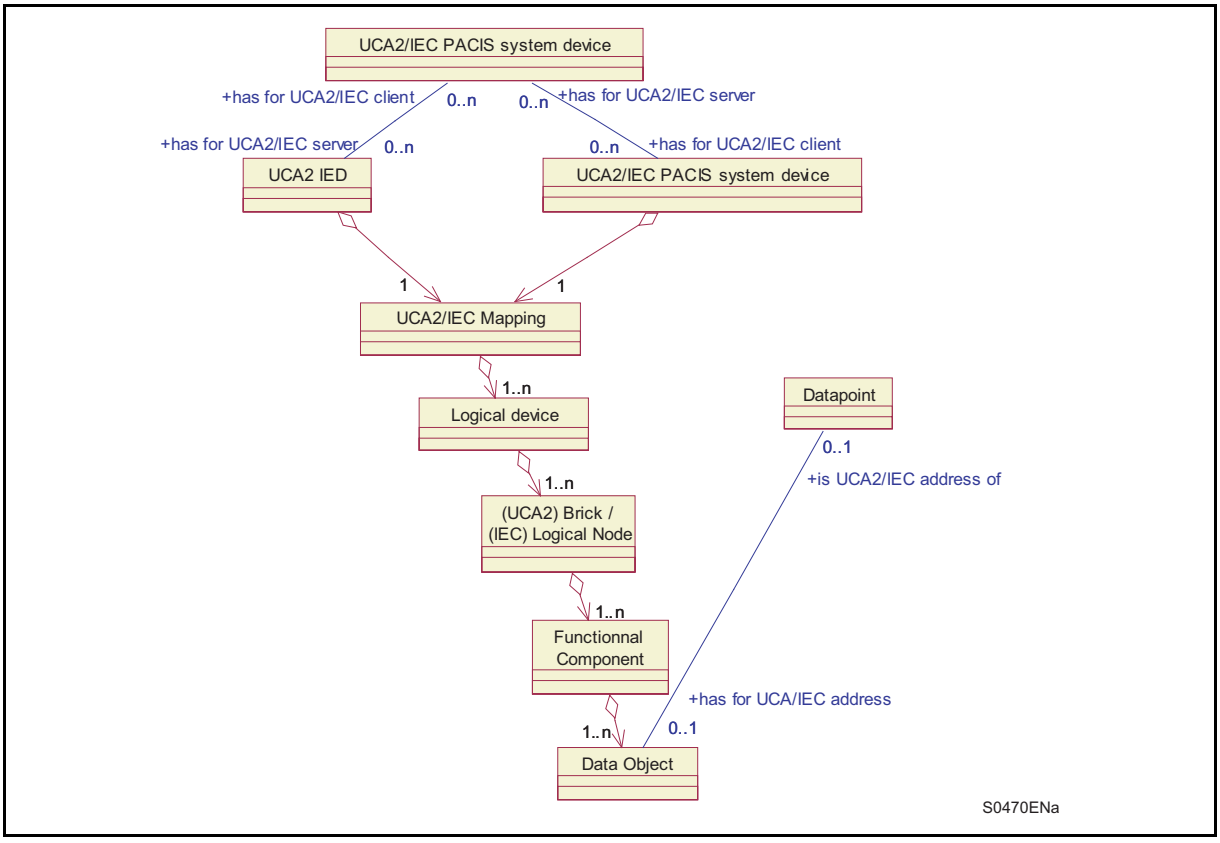
The present document is a chapter of PACiS SCE V4.5 documentation binders.

It describes:

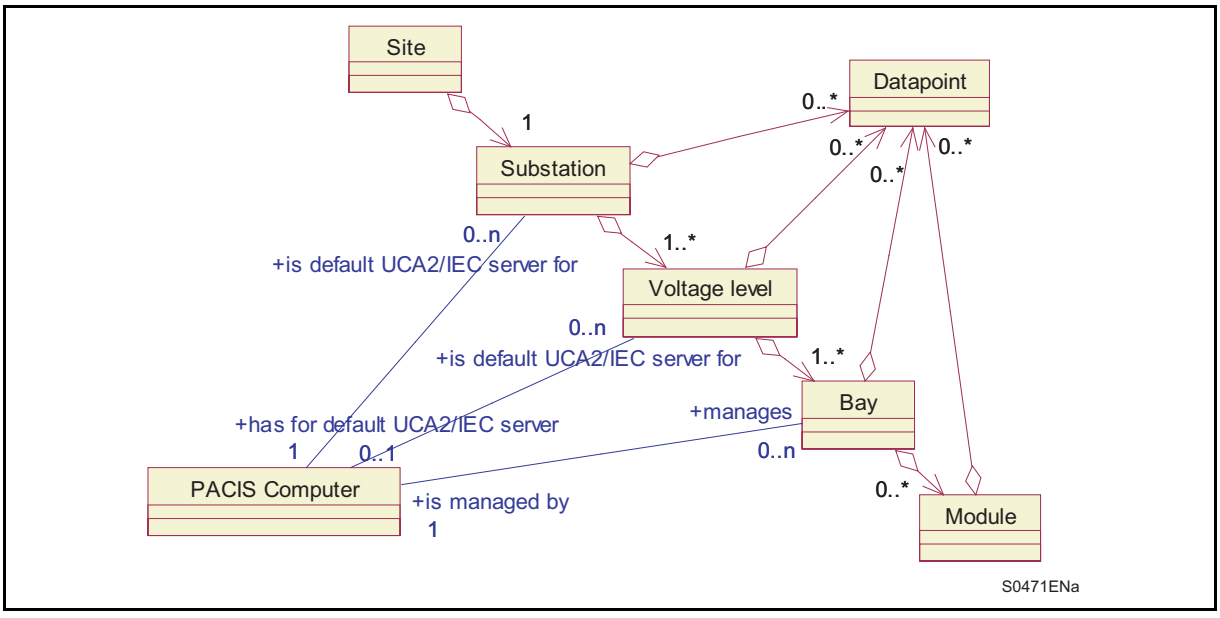
- the station bus automatic addressing of datapoints. Implemented PACiS Station Bus (SBus) protocol is IEC 6185. Non-PACiS IED is out of scope of this document.

## 2. PACiS IEC 61850 PROJECTION

IEC61850 mapping of an IED is an aggregation of Logical Devices (LD), composed of Logical Nodes (LN), Functional Components (FC) and DataObjects (DO). This mapping is used to model the subset of substation's electrical devices managed by the server.




Electrical plant items are modelling with the following structure:




Automatic-addressing consists to create IEC61850 mapping and in particular DataObjects and to link them with Datapoints. This creation process follows some **rules**.

Theses rules are defined by hierarchical level: Logical Devices, then Logical Nodes then DataObjects.

## 2.1 Logical Device Rules

- One Logical Device **LD0** is created for each **PACiS SBus devices**. LD0 is pre-defined for each type of IED (C264, GTW, OI) and contains system information of the IED: a LN **DIAG,** a LN **LLN0** and two empty LN **DBID** and **LPHD** are defined and used by system datapoints of the device.
- One Logical Device **SYSTEM** is created for each **C264 Legacy IED**. Under this LD is defined a Logical Node named IEDDIAG. that contains some DataObjects used by system datapoints of the legacy IED.
  During edition, this LD is named only **SYSTEM**. During generation of .dm file, this Logical Device is prefixed by the <C264_name> and its <IED_name>.
- One Logical Device **CONTROL** is created for each MiCOM C264 device. It contains Logical Nodes and DataObjects used for mapping **Electrical** objects (Substation / Voltage Level / Bays / Module / Datapoints).
- One Logical Device **PROTECTION** is created for a MiCOM C264P that manages **Relay** Built-in functions.
- One Logical Device **MEASUREMENT** is created for a C264 that manages:
  - measures computed by a **C264 TMU 200** or **TMU 210** board
  - measures linked to an **Energy counting** function.

## 2.2 Logical Node Rules

- All Logical Nodes are **suffixed** by a number: default value is **1**, range is [1..9 999 999]; except for LLN0 and some LN of LD0.
- A **Logical Node name** must be **unique** in the whole IEC61850 mapping, except for LLN0, DBID and LPHD. The uniqueness is done with number suffix (see previous rule).
- One Logical Node LD0/**TCIDIAG** is created for each **C264 SCADA protocol**.
- A Logical Node SYSTEM/**RDRE** is created for the **Legacy IED** SPS 'disturbance file ready'.
- A Logical Node CONTROL/**GBAY** is created for each bay that is managed by a server and that contains some particular bay datapoints.
- A Logical Node is created for **each module** of bay that is managed by a server:

| **Bay module** | **IEC61850 LD and LN** |
|---|---|
| Circuit breaker | CONTROL/CSWI or CONTROL/XCBR |
| Switchgear | CONTROL/CSWI |
| Capacitor | CONTROL/ZCAP |
| Converter | CONTROL/ZCON |
| Generator | CONTROL/ZGEN |
| Motor | CONTROL/ZMOT |
| Transformer | CONTROL/YPTR |
| Auto-recloser | CONTROL/RREC |
| Synchro-check | CONTROL/RSYN |
| ATCC | CONTROL/ATCC |
| Tap Changer | CONTROL/YLTC |

- A logical Node CONTROL/**GAPC** is created for each User function/Slow Automatism (ISaGRAF) under the server where the automatism runs (relation 'runs on:').

- Some Logical Nodes CONTROL/**GGIO** are created for generic modules. A generic module is a non-typed module. Numerical suffix is used when several GGI0 exists. The **number of GGIO is minimized** with the following assertion:

  No more 50 ST DataObjects could be defined under the same GGIO.
  No more 50 MX DataObjects could be defined under the same GGIO.
  No more 50 SP DataObjects could be defined under the same GGIO.
  No more 50 CO DataObjects could be defined under the same GGIO.

- A Logical Node CONTROL/**CILO** is created for each xPC datapoints for which **Interlocking datapoints** are defined.

- A Logical Node CONTROL/**RDRE** is created for the **C264** SPS 'disturbance file ready'.

- A Logical Node is created for **each threshold** of bay **relay** function that is managed by a server.

| **Bay relay built-in function** | **IEC61850 LD and LN / threshold** |
|---|---|
| [27] Phase undervoltage | PROTECTION/PTUV |
| [32N] Earth wattmetric | PROTECTION/PDOP |
| [37] Phase under current | PROTECTION/PTUC |
| [46] Seq inv overcurrent | PROTECTION/sqPTOC |
| [49] Thermal overload | PROTECTION/PTTR |
| [50BF] Breaker failure | PROTECTION/RBRF |
| [59] Phase overvoltage | PROTECTION/phPTOV |
| [59N] Earth over voltage | PROTECTION/gndPTOV |
| [67] Phase dir overcurrent | PROTECTION/phPTOC |
| [67N] Earth dir overcurrent | PROTECTION/gndPTOC |
| [81U] Under Frequency | PROTECTION/PTUF |
| [81O] Over Frequency | PROTECTION/PTOF |
| [81R] Range Frequency | PROTECTION/PFRC |
| General Trip | PROTECTION/PTRC |
| Automatism | PROTECTION/GGIO |

### 2.3 DataObject Rules

– **Default dataObject naming** rule: a **dataObject** is created with a **name** and a **common class** under a Functional Component and a Logical Node. This Logical Node represents the parent of the datapoint: a bay, a module, a built-in function or a user function. Logical Node rules are defined in the previous section.

Datapoint could be linked to another datapoint through relation 'has for feedback'.

With SBO or without SBO is the SBO mode value of the datapoint profile.

The column Functional Component indicates the dataobjects created for one datapoint: a dataObject by component. SV components are optional.

The column DataObject Common classes indicates the common class used for each dataObject of datapoint.

| Datapoint | Functional Components | DataObject default Name | DataObject Common classes |
|---|---|---|---|
| SPS without associated xPC | ST, SV | Ind | SPS_ST, SPS_SV |
| SPS with linked xPC without SBO | ST, SV | SPCSO | SPC_Orig_ST, SPS_SV |
| SPS with linked xPC with SBO | ST, SV | SPCSO | SPC_Orig_ST, SPS_SV |
| DPS without associated xPC | ST, SV | Ind | DPS_ST, DPS_SV |
| DPS with linked xPC without SBO | ST, SV | SPCSO | DPC_Orig_ST, DPS_SV |
| DPS with linked xPC with SBO | ST, SV | DPCSO | DPC_Orig_ST, DPS_SV |
| MPS | ST, SV | IntIn | INS_ST, INS_SV |
| MV without associated Setpoint | MX, SV, CF | AnIn | MV_MX, MV_SV, MV_CF |
| MV with linked Setpoint | MX, SV, CF | AnIn | APC_Orig_MX, MV_SV, APC_CF |
| Tap position MV with linked Raise/lower DPC | ST, SV | TapPos | BSC_Orig_ST, BSC_SV |
| Counter | ST, CF | Cnt | BCR_ST, BCR_CF |
| SPC without SBO | CO, CF | SPCSO | SPCDPC_Direct, SBO_CF |
| SPC with SBO | CO, CF | SPCSO | SPCDPC_SBO_Sec, SBO_CF |
| DPC without SBO | CO, CF | DPCSO | SPCDPC_Direct, SBO_CF |
| DPC with SBO | CO, CF | DPCSO | SPCDPC_SBO_Sec, SBO_CF |
| Raise/Lower DPC for TPI without SBO | CO, CF | TapChg | BSC_Direct, BSC_CF |
| Raise/Lower DPC for TPI with SBO | CO, CF | TapChgSO | BSC_SBO_Sec, BSC_CF |
| Setpoint without SBO | SP, CF | APC | APC_Direct, APC_CF |
| Setpoint with SBO | SP, CF | APCSO | APC_SBO_Sec, APC_CF |

– **Particular dataObject naming rule** is refined for some datapoint. The Logical Node under which the DataObject is created depend of Logical Node rules.

Only common classes different from the default common classes are re-defined in this table. The default common class is done then throw the type of the datapoint and the previous table. The type of datapoint is done by the last part of datapoint mnemonic. For example AR_Status_MPS is a MPS.

| Parent | Datapoint mnemonic | Datapoint name | DataObject Name | Specific common classes |
|---|---|---|---|---|
| Substation | LocRemSubstation | Local/remote DPS | LocSubst | |
| | LocRemSubstation_DPC | Loc/rem ctrl DPC | LocSubst | |
| Bay | LocRemBay | Local/remote DPS | Loc | |
| | LocRemBay_DPC | Loc/rem ctrl DPC | Loc | |
| | OrderInProgress (SPS) | Order running | OrdRun | SPS_ST |
| | SBMCBay | SBMC SPS | SBMCDS | |
| | SBMCBay_SPC | SBMC control SPC | EnaSBMC | |
| Module | LockModule | Lock SPS | Lock | |
| | LockModule_SPC | Lock control SPC | Lock | |
| | OrderInProgress (SPS) | Order running | OrdRun | SPS_ST |
| Circuit breaker | Select (SPS) | Phys. selection | Sel | |
| | Switch_DPC_PhA | Switch phA DPC | PosA | |
| | Switch_DPC_PhB | Switch phB DPC | PosB | |
| | Switch_DPC_PhC | Switch phC DPC | PosC | |
| | CBHealthy_SPS | CB Healthy | CBOpCap | |
| | Switch_SPC | Switch Ctrl SPC | PosSPC | |
| | Switch_DPC | Switch Ctrl DPC | Pos | |
| | ComputedSwitchPos_DPS | Comp. swit. pos. | Pos | |
| Switchgear | Select | Phys. selection | Sel | |
| | Switch_SPC | Switch Ctrl SPC | Pos | |
| | Switch_DPC | Switch Ctrl DPC | Pos | |
| | SwitchPos | Switchgear pos. (DPS) | Pos | |
| | SwitchPos_SPS | Switchgear pos. | Pos | |

| Parent | Datapoint mnemonic | Datapoint name | DataObject Name | Specific common classes |
|---|---|---|---|---|
| Synchrocheck built-in function | CS_AcceptForcing_SPS | Accept forcing | ForcAlw | |
| | CS_AuthoState_SPS | Possible closing | EnaCls | |
| | CS_CloseOrderState_SPS | Close order | ClsOpSt | |
| | CS_CtrlOnOff_DPC | on/off ctrl DPC | Ena | |
| | CS_CtrlOnOff_SPC | on/off ctrl SPC | Ena | |
| | CS_Locked_SPS | CS locked | LockSt | |
| | CS_OnOff_DPS | on/off DPS | Ena | |
| | CS_OnOff_SPS | on/off SPS | SyncSt | |
| | CS_VoltageAbsence_SPS | Voltage absence | VAbs | |
| | CS_VoltagePresence_SPS | Voltage presence | VInd | |
| | CS_VoltageRefAbsence_SPS | Ref. U absence | VRefAbs | |
| | CS_VoltageRefPresence_SPS | Ref. U presence | VRefInd | |
| Autorecloser built-in function | AR_CtrlOnOff_DPC | on/off ctrl DPC | Ena | |
| | AR_FaultReason_MPS | Autorecloser flt | ARFlt | |
| | AR_OnOff_DPS | on/off | Ena | |
| | AR_Status_MPS | Autorecloser st | ARSt | |
| | Trip_SPS | Trip 3 phases | Trip3P | |
| | Ctrl3PhaseTrip_SPC | Force trip 3P | Trip3P | |
| Tap changer built-in function | TAPHigherPos_SPS | Higher position | HiTapPos | |
| | TAPInProgress_SPS | Tap in progress | TCIP | |
| | TAPLowerPos_SPS | Lower position | LoTapPos | |
| | TAPSelect_SPC | TAP Select SPC | TapPos | |
| | MCBCtrlOpen_SPC | MCB open SPC | OpnMCB | |
| | SPI | Tap pos ind | TapChg | BSC_ST |
| | RaiseLower_DPC | Raise/lower DPC | TapChg | BSC_DIRECT \| BSC_SBO_Sec<br>BSC_CF |

| Parent | Datapoint mnemonic | Datapoint name | DataObject Name | Specific common classes |
|---|---|---|---|---|
| Relay built-in function threshold | XX_thresholdY_inst<br>With: XX = function number<br>Y = threshold number | * inst. | Str | ACD_ST |
| | XX_threshold_Y_mode<br>With: XX = function number<br>Y = threshold number | * mode | Mod | INC_ST, INS_SV |
| | XX_thresholdY_temp<br>With: XX = function number<br>Y = threshold number | * temp. | Op | ACT_ST |
| Relay [49] built-in function | 49_th_alarm | 49 th alarm | AlmThm | ACT_ST |
| | 49_th_overload | 49 th overload | Op | ACT_ST |
| Relay [50] built-in function | 50BF_breaker_failure | break fail | OpIn | ACT_ST |
| ATCC built-in function | ATCC_Alarmed_SPS | ErrorLog | AtcFlt | |
| | ATCC_BusbarCtrlOnOff_SPC | ATCC on/off ctrl | EnaBus1 | |
| | ATCC_BusbarInhibited_SPS | ATCC inhibited | BusInh1 | |
| | ATCC_BusbarInterTargetRunning_SPS | ATCC to target | TargIP1 | |
| | ATCC_BusbarInvalidModule_SPS | ATCC inv module | BusDvInv1 | |
| | ATCC_BusbarInvalidVoltage_SPS | ATCC inv voltage | BusVInv1 | |
| | ATCC_BusbarMaxTRFReached_SPS | ATCC max transfo | MoreTrf1 | |
| | ATCC_BusbarOnOff_SPS | ATCC on/off | EnaBus1 | |
| | ATCC_BusbarTarget1Running_SPS | ATCC target 1 | EnTg1Bus1 | |
| | ATCC_BusbarTarget2Running_SPS | ATCC target 2 | EnTg2Bus1 | |
| | ATCC_BusbarTarget3Running_SPS | ATCC target 3 | EnTg3Bus1 | |
| | ATCC_BusbarTarget4Running_SPS | ATCC target 4 | EnTg4Bus1 | |
| | ATCC_BusbarTarget5Running_SPS | ATCC target 5 | EnTg5Bus1 | |

| Parent | Datapoint mnemonic | Datapoint name | DataObject Name | Specific common classes |
|---|---|---|---|---|
| | ATCC_BusbarVoltage_MV | BusBar voltage | Vbus1 | |
| | ATCC_CtrlClearAlarm_SPC | ATCC clear alarm | ClearFlt | |
| | ATCC_CtrlOnOff_SPC | ATCC on/off ctrl | Ena | |
| | ATCC_DBIOverride_SPS | DBI override | DBIOver | |
| | ATCC_MCBPos_DPS | MCB position DPS | MCBPos | |
| | ATCC_MCBPos_SPS | MCB position SPS | MCBPos | |
| | ATCC_MCBTrip_SPS | MCB trip | MCBTr1 | |
| | ATCC_OnOff_SPS | on/off | Ena | |
| | ATCC_TAPBadTCIP_SPS | TAP bad TCIP | BadTCIP1 | |
| | ATCC_TAPInvalidTCIP_SPS | TAP invalid | InvPos1 | |
| | ATCC_TAPLongTCIP_SPS | TAP long TCIP | LongTCIP1 | |
| | ATCC_TAPRunAway_SPS | Run away | RunAway | |
| | ATCC_TXFFaultOnEqptDisc_SPS | ATCC disc eqpt | DcnxTrf1 | |
| | ATCC_TXFFaultOnLocalBay_SPS | ATCC local bay | LocTrf1 | |
| | ATCC_TXFHoming_MPS | ATCC homing | HomTrf1 | |
| | ATCC_TXFHunting_SPS | ATCC hunting | HuntTrf1 | |
| | ATCC_TXFInvalidVoltage_SPS | ATCC inv voltage | Vinv | |
| | ATCC_TXFLowerActivePower_MV | Second. active P | PTrf1 | |
| | ATCC_TXFLowerCurrent_MV | Second. current | ITrf1 | |
| | ATCC_TXFLowerReactivePower_MV | Second. react. Q | QTrf1 | |
| | ATCC_TXFLowerVoltage_MV | Second. voltage | VTrf1 | |
| | ATCC_TXFOnOff_SPS | ATCC on/off | ModTrf1 | |
| | ATCC_TXFOverCurrent_SPS | ATCC overcurrent | OCTrf1 | |
| | ATCC_TXFOverVoltage_SPS | ATCC overvoltage | OVTrf1 | |
| | ATCC_TXFUnderVoltage_SPS | ATCC low-voltage | UVTrf1 | |
| | ATCC_TargetNotReached_SPS | target unreached | TarNach | |

| Parent | Datapoint mnemonic | Datapoint name | DataObject Name | Specific common classes |
|---|---|---|---|---|
| xPC | OpenIntlkSPS | Open intlk SPS | EnaOpn | |
| | CloseIntlkSPS | Close intlk SPS | EnaCls | |
| | | | | |

- Particular dataObject naming rule is refined for some datapoints:
  - MV computed by TMU 200,TMU 210 or TMU220,
  - Counter which integrates energy (function energy counter)

For a C264, **only one** Logical Node rmsMMXU, powMMXU, effMMXU and MMTR exists.

**Bold columns** indicate all IEC 61850 objects (LD, LN, FC, DO) for each type of MV or counter.

| Common classes | DataObject Parent path (LD/LN/FC/DO) | DataObject Name | MV type Name | MV type id |
|---|---|---|---|---|
| WYE_MX, WYE_CF, WYE_SV | MEASUREMENT/rmsMMXU1/MX/phV | phsA | VAN, RMS value of the voltage phase A | 0 |
| | | phsB | VBN, RMS value of the voltage phase B | 1 |
| | | phsC | VCN, RMS value of the voltage phase C | 2 |
| | | neut | Vr , RMS value of voltage | 3 |
| DEL_MX, DEL_CF, DEL_SV | MEASUREMENT/rmsMMXU1/MX/PPV | phsAB | VAB, RMS value of the voltage phase AB | 4 |
| | | phsBC | VBC, RMS value of the voltage phase BC | 5 |
| | | phsCA | VCA, RMS value of the voltage phase CA | 6 |
| WYE_MX, WYE_CF, WYE_SV | MEASUREMENT/rmsMMXU1/MX/A | phsA | IA, RMS value of the current phase A | 7 |
| | | phsB | IB, RMS value of the current phase B | 8 |
| | | phsC | IC, RMS value of the current phase C | 9 |
| | | neut | Ir, RMS value of the current | 10 |
| MV_MX, MV_CF, MV_SV | MEASUREMENT/rmsMMXU1/MX | Hz | network frequency | 36 |
| MV_MX, MV_CF, MV_SV | MEASUREMENT/powMMXU1/MX | TotW | Pt, total active power | 26 |
| MV_MX, MV_CF, MV_SV | MEASUREMENT/powMMXU1/MX | TotVAr | Qt, total reactive power | 27 |

| Common classes | DataObject Parent path (LD/LN/FC/DO) | DataObject Name | MV type Name | MV type id |
|---|---|---|---|---|
| MV_MX, MV_CF, MV_SV | MEASUREMENT/powMMXU1/MX | TotPF | cos t: Power factor | 29 |
| WYE_MX, WYE_CF, WYE_SV | MEASUREMENT/effMMXU1/MX/A | phsA | mod Ia (ADC) | 184 |
| | | phsB | mod Ib (ADC) | 185 |
| | | phsC | mod Ic (ADC) | 186 |
| | | neut | mod Io (ADC) | 187 |
| DEL_MX, DEL_CF, DEL_SV | MEASUREMENT/effMMXU1/MX/PPV | phsAB | mod Vab (ADC) | 188 |
| | | phsBC | mod Vbc (ADC) | 189 |
| | | phsCA | mod Vca (ADC) | 190 |

| Common classes | DataObject Parent path (LD/LN/FC/DO) | DataObject Name | Counter Name |
|---|---|---|---|
| BCR_ST, BCR_CF | MEASUREMENT/MMTR1/ST | TotWh | Counter which integrates Reactive Energy of a MV |
| | | TotVArh | Counter which integrates Active Energy of a MV |
| INC_Orig_St, INC_SV | MEASUREMENT/GGIO | OpCntRS | Operating Counter (feedback of Setpoint |
| INC_Direct, Direct_CF | MEASUREMENT/GGIO | OpCntRS | Setpoint having as feedback an Operating Counter |
| INC_ST, INC_SV | MEASUREMENT/GGIO | OpCnt | Operating Counter (alone) |

- DataObjects of datapoints linked with ‘has for **feedback**’ relation have the **same name:** the dataObject name of the xPC.
- **Coupling** between DataObjects linked to the same datapoint is done **by naming**: theses DataObjects located under different Functional Components (SV, CF) have the same name.
- **SV dataObject is optional**. It exists if flag ‘enable Force/Subst/Sup’ of profile of datapoint is set to ‘Yes’.
- **Only no-spared** datapoints are **taken into account** in auto-addressing. If a datapoint is unspared then an auto-addressing treatment maus be done again.
- Some **datapoints are out of scope** of auto-addressing. Theses datapoints are identified by their data model mnemonic and their short name.

| Parent | Excluded mnemonic datapoint | Excluded Datapoint name |
|---|---|---|
| Module Circuit breaker | SynCheck_Close_DPC | Sync CB close |
| | SynCheck_Close_SPC | Sync CB close |
| | Select_SPC | Selection SPC |
| | Switch_SPC_Ph[A\|B\|C] | Switch ph[A\|B\|C] SPC |
| | SwitchPos_SPS_Ph[A\|B\|C] | Switch Ph[A\|B\|C] pos. |
| | SwitchPos (DPS) | Switchgear pos. |
| | SwitchPos_SPS | Switchgear pos. |
| | PhaseNotTogether_SPS | Ph not together |
| External automatic synchrocheck built-in function | CS_CtrlOnOff_DPC | on/off ctrl DPC |
| | CS_CtrlOnOff_SPC | on/off ctrl SPC |
| Relay built-in functions | XX_thresholdY_trip<br>With:XX = function number<br>Y = threshold number | * Trip |
| | XX_thresholdY_inst_dir_rev<br>With:XX = function number<br>Y = threshold number | * in di rev |
| | XX_thresholdY_interlock<br>With:XX = function number<br>Y = threshold number | * interlock |
| Relay [automatism] built-in function | start_disturbance | start dist ctrl |
| Relay [49] built-in function | 49_trip_th_overload | 49 trip th over. |

Wild char (*) or pseudo regular expression ([A|B|C]) is used to specify several datapoints.

## 2.4 Goose Rules

- Only **MX or ST** DataObjects under Functional Components MX and ST could be goosed.
- DataObject is transmitted by goose if the linked datapoint is used in a remote automatism (FBD, ISaGRAF). Remote means the server of datapoint is not the server of automatism. "Global Alarm Acknowledgement" SPS is always transmittted by goose. **Automatic Goose transmission** flag of a dataObject contains these conditions.
- **Manual Goose transmission flag** of a dataObject is set manually by user. Between two auto-addressing, the value of this flag is kept if the dataObject exists yet.
- DataObject is transmitted by goose if its **Automatic or Manual** Goose transmission flags are true.
- **Capacity of each goose** (one for ST, one for MX) is limited to 1250 bytes.

# LEXICAL

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# 1. SCOPE OF THE DOCUMENT

This document is a chapter of PACiS SCE documentation binders. It is the lexical.

## 2. LEXICAL

| | |
|---|---|
| AC | Alternative Current |
| ACU | Analog transduCerless Unit<br>MiCOM C264 Additional Mezzanine on CPU for CT/VT |
| ADC | Analogue to Digital Converter |
| AI | Analogue Input (Measurement Value including state attribute)<br>Commonly Voltage or current DC signals delivered by transducers, and representing an external value (refer to CT/VT for AC). |
| AIS | Air Insulated Substation |
| AIU | Analogue Input Unit<br>MiCOM C264 Board name for DC Analog Input |
| Alarm | An alarm is any event tagged as an alarm during configuration phase |
| AO | Analogue Output<br>Value corresponding to a desired output current applied to a DAC. |
| AOU | Analogue Output Unit<br>MiCOM C264 board name for DC AO |
| API | Application Programming Interfaces |
| ASCII | American Standard Code for Information Interchange |
| ASDU | Application Specific Data Unit<br>Name given in OSI protocol for applicative data (T103, T103..) |
| ATCC | Automatic Tap Change Control<br>Same as AVR, automation charged to regulate secondary voltage |
| Attribute | Define in IEC61850 as: named element of data which has a specific type |
| AVR | Automatic Voltage Regulator<br>Automatism used to regulate secondary voltage by automatic tap changer control (see ATCC). |
| Bay | Set of LV, MV or HV plants (switchs and transformer) and devices (Protective, Measurement…) usually around a Circuit Breaker and controlled by a bay computer. |
| BCD | Binary Coded Decimal<br>One MiCOM C264 supported coding on a set of Digital Input, that determine a Digital Measurement, then Measurement value (with specif invalid code when coding is not valid). Each decimal digit is coded by 4 binary digit. |
| BCP | Bay Control Point<br>Name given to the device or part used to control a bay. It can be Mosaic Panel , MiCOM C264 LCD ‘Local Control Display),… Usually associate with Remote/Local control. |
| BI | Binary Input (or Information)<br>Name given into MiCOM C264 of information already filtered, before it becomes a SPS, DPS… with time tag and quality attributes |
| BIU | Basic Interface Unit<br>MiCOM C264 Board for auxiliary power supply, watchdog relay, 2 DO, 2 RS232/485 insulated ports |

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|---|---|
| B-Watch | Monitoring and control device for GIS substation. |
| CAD | Computer Aided Design<br>Computer application dedicated to design like wiring, protective setting… |
| CAS | Case<br>MiCOM C264 rack |
| CB | Circuit Breaker<br>Specific dipole switch with capability to power on and break on fault current. Some has not isolation capability (nominal-earth at each side) |
| CBC | Compact Bay Controller<br>Small capacity bay computer for Medium Voltage applications typically MiCOM C264C |
| CCU | Circuit breaker Control Unit<br>MiCOM C264 Board dedicated to switch control with 8DI, 4 DO |
| CDM | Conceptual Data Modeling<br>Is the modelisation of system/devices data using a hierarchy of structured data (called object of class) with their attributes, method or properties and the relations between themselves.<br>It maps common data to devices or components of devices, with garanty of interoperability. |
| Class | Define in IEC61850 as: description of a set of objects that share the same attributes, services, relationships, and semantics |
| Client | Define in IEC61850 as: entity that requests a service from a server and that receives unsolicited messages from a server |
| CPU | Central Processing Unit<br>MiCOM C264 main Board based on PowerPC |
| CRC | Cyclic Redundancy Check<br>Coding result send with packet of transmitted data to guarantee their integrity. Usually result of a division of transmitted data by polynom. |
| CSV | Character Separate Values<br>Asci values separated by predefined character or string like in Excel or ASCII Comtrade. |
| CT | Current Transformer<br>Basically the electric device connected to process and extracting a current measurement. By extension part of a device (MiCOM C264) that receives this AC value and convert it to numerical measurement value. CT are wired in serial. |
| CT/VT (Conventional) | Current and Voltage transformers<br>By extension the MiCOM C264 board and module (ACU, TVU, TCU) that capture via wiring and digitalize the DC measurement. |
| CT/VT (Non-Conventional or intelligent) | Current and Voltage transformers<br>New generation of captor based for example on on-light diffraction under electric field, without transformer, that give s directly numerical measurement of voltage and current like communicating IED. |
| DAC | Digital to Analogue Converter<br>Used to generate analogue signals (usually DC) from a digital value. |

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| Data | Define in IEC61850 as: meaningful structured information of applications located in an automation device which can be read or written.( NOTE This definition is in accordance with the Data definition of IEC 61850-7-2. The MMS use of Data refers to data types and potential instantiations of MMS variables. The reader of this part of IEC 61850 shall be careful of the context in which “data” is being used.) |
| DB | DataBase<br>Tool or set of data that define all configuration of a system or specific device like computer. Opposed to setting or parameter DB has a structure that can not be modified on line. DB are always versioned. |
| DBI | Don’t Believe It<br>Term used for undefined state of a double point when input are not complementary. DBI00 is state motion or jammed. DBI11 is undefined. |
| DC, DPC | Double (Point) Control<br>Two digit and/or relays outputs used for device control with complementary meaning (OPEN, CLOSE). |
| DCF77 | Extern master clock and protocol transmission<br>LF transmitter located at Mainflingen, Germany, about 25 km south-east of Frankfurt/Main, broadcasting legal time on a 77.5 kHz standard frequency. |
| DCP | Device Control Point<br>Located at device level (electric device or IED). It should have its own Remote/Local switch. |
| DCS | Digital Control System<br>Generic name of system based on numeric communication and devices, to be opposed to traditional electrically wired control. |
| DCT | Double CounTer<br>Counter based on 2 DI with complementary states (counting switgear maneuver for example) |
| Device | Term used for one of the following unit:<br>Protective relays, metering units, IED, switchgear (switching device such as CB, disconnector or earthing switch), disturbance or quality recorders<br>Define in IEC61850 as: entity that performs control, actuating and/or sensing functions and interfaces to other such entities within an automation system (NOTE Devices alone do not perform energy transport functions.) |
| DI | Digital Input<br>Binary information related to the presence or to the absence of an external signal, delivered by a voltage source. |
| DIU | Analogue Input Unit<br>MiCOM C264 Board name for DC Analog Input |
| DM | Digital Measurement<br>Is a measurement value which acquisition is done by DI and a specific coding BCD, Gray, 1 among N… |
| DO | Digital Output<br>Used to apply a voltage to an external device via a relay, in order to execute single or dual, transient or permanent commands. |

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|---|---|
| DOF | Degree Of Freedom<br>This notion is used for a template attribute, which can be or not modified when it is used. An attribute has a degree of freedom if an user can modify its values on its instances. |
| DOU | Analogue Input Unit<br>MiCOM C264 Board name for DC Analog Input |
| DOU | Digital Output Unit<br>MiCOM C264 board with output relays |
| DP | Double Point<br>Information/control derived from 2 digital inputs/output; usually used for position indication of switching devices (OPEN, CLOSE). |
| DPS | Double Point Status<br>Position indication of switching devices (OPEN, CLOSE). |
| DTD | Document Type Definition<br>Structured description of an XML document. |
| EH90 | Transmission protocol dedicated to time synchronization and standardized by EDF. Specification document: D.652/90-26c, March 1991. |
| Event | An event is a time tagged change of state/value acquired or transmitted by a digital control system. |
| FAT | Factory Acceptance Test<br>Validation procedures execution with the customer at factory.(SAT) |
| FBD | Functional Block Diagram<br>One of the IEC61131-3 programming languages (language used to define configurable automation). |
| Gateway | Level 6 session of OSI, the gateway is any device transfering data between different networks and/or protocol. The RTU function of MiCOM C264 gives a gateway behaviour to SCADA or RCP level. PACiS Gateway is separate PC base device dedicated to this function. C364 or PCI is referenced also as a gateway between IED and upper lever of communication. |
| GHU | Graphic Human interface Unit<br>MiCOM C264 Front Panel digital part (LCD, buttons, Front RS) |
| GHU | Graphical Human Unit<br>Front panel of MiCOM C264 with LCD and buttons |
| GIS | Gas Insulated Substation |
| GMT | Greenwich Meridian Time<br>Absolute time reference |
| GOOSE | Generic Object Oriented Substation Event |
| GSSE | Generic Substation Status Event |
| GPS | Global Positioning System<br>Based on triangulation from satellite signal, that transmit also absolute GMT time used to synchronize a master clock |
| Group | Logical combination of BI (i.e. SP, DP, SI or other groups). |

| | |
|---|---|
| Hand Dressing | Facility for an operator to set manually the position of a device (acquired by other means) from the HMI at SCP level; e.g. from OPEN to CLOSE (without any impact on the “ physical ” position of the electrical switching device). |
| HMI | Human Machine Interface<br>Can be PACiS OI(Operator Interface) or MiCOM C264 LCD (Local Control Display) or Leds, mosaic... |
| HSR | High Speed autoRecloser<br>First cycles of AR |
| HTML | Hyper Text Mark-up Language<br>Used as standard for formatting web display |
| HV | High Voltage (for example 30kV to 150kV) |
| I/O | Input/Output |
| IEC | International Electrotechnical Commission |
| IED | Intelligent Electronic Device<br>General expression for a whole range of microprocessor based products for data collection and information processing |
| IRIG-B | Inter-Range Instrumentation Group standard format B. This is an international standard for time synchronization based on analog signal. |
| JAMMED | Invalid state of a Double Point:<br>Occurs when the two associated digital inputs are still in state 0 after an user-selectable delay (i.e. when the transient state “ motion ” is considered as ended). |
| Kbus<br>(Kbus Courier) | Term used for the protocol Courier on K-Bus network (kind of RS422). |
| L-BUS | Legacy Bus<br>Generic name of Legacy or field networks and protocols used to communicate between MiCOM C264 (Legacy Gateway function) and IED on field bus. Networks are based on (RS232,) 422, 485. Protocols are IEC 60850-5-103 (T103 or VDEW), Modbus or MODICON |
| LCD | Liquid Crystal Display<br>Local Control Display<br>On MiCOM C264 |
| LD | Ladder Diagram<br>One of the IEC1131-3 programming languages (language used to define configurable automation). |
| LD | Logical Device<br>Define in IEC61850 as: An entity that represents a set of typical substation functions |
| LED | Light Emitting Diode |
| LF | Low Frequency |
| LN | Logical Node<br>Define in IEC61850 as: An entity that represents a typical substation function |
| LOC | Local Operator Console<br>Dedicated to maintenance operation |

| | |
|---|---|
| Local / Remote Control Mode | When set to local for a given control point it means that the commands can be issued from this point, else in remote control are issue for upper devices. |
| Local / Remote Control Mode | When set to local for a given control point it means that the commands can be issued from this point, else in remote control are issue for upper devices. |
| LV | Low Voltage |
| MAFS | Marketing And Functional Specification |
| MC | Modular Computer |
| Measurements | Values issued from digital inputs or analogue inputs (with value, state and time tag). |
| Metering (non-tariff) | Values computed depending on the values of digital or analogue inputs during variable periods of time (time integration). |
| Metering (tariff) | Values computed depending on the values of digital or analogue inputs during variable periods and dedicated to the energy price fixing. These values are provided by dedicated “ tariff computer ” which are external to the MiCOM Systems. |
| MIDOS | Schneider Electric Connector<br>Used for CT/VT acquisition |
| MMC | Medium Modular Computer |
| MMS | Manufacturing Message Specification (ISO 9506) |
| ModBus | Communication protocol used on secondary networks with IED or with SCADA RCP. 2 versions exist with standard MODICON or Schneider Electric one. |
| Module | Word reserved in PACiS SCE for all electric HV devices. It groups all switch-gears, transformer, motors, generators, capacitors, … |
| MOTION | Transient state of a Double Point<br>Occurs when the two associated digital inputs are momentarily in state 0 (e.g. position indication when an electrical device is switching ). The concept of “ momentarily” depends on a user-selectable delay. |
| MPC | Protection Module for Computer |
| MV | Medium Voltage |
| NBB | Numerical Busbar Protection |
| NC | Normally Closed (for a relay) |
| NO | Normally Open (for a relay) |
| OBS | One Box Solution<br>Computer which provides protection and control functions with local HMI. The prime application of this device is intended for use in substations up to distribution voltage levels, although it may also be used as backup protection in transmission substations. Likewise, the OBS may be applied to the MV part of a HV substation which is being controlled by the same substation control system. |
| OLE | Object Linking and Embedding<br>OLE is a Microsoft specification and defines standards for interfacing objects. |
| OPC | OLE for process control<br>OPC is a registered trademark of Microsoft, and is designed to be a method to allow business management access to plant floor data in a consistent manner. |

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| Operation hours | Sum of time periods, a primary device is running under carrying energy, e.g. circuit breaker is in Close-state and the current is unequal 0 A. |
| OSI | Open System Interconnection<br>Split and define communication in 7 layers: physical, link, network, transport, session, presentation, application |
| PDF | Portable Document Format |
| PDU | Define in IEC61850 as: Protocol Data Unit |
| PICS | Define in IEC61850 as: Protocol Implementation Conformance Statement |
| PIXIT | Define in IEC61850 as: Protocol Implementation Extra Information |
| PLC | Programmable Logic Control<br>Within the PLC-programs are defined the configurable control sequences or automations taken into account by the MiCOM Systems. |
| POW | Point On Wave<br>Point on wave switching is the process to control the three poles of an HV-circuit breaker in a way, to minimize the effects of switching. |
| PSTN | Public Switched Telephone Network |
| PT100 | Probes of temperatures providing analogue signals. |
| RCC | Remote Control Centre<br>Is a computer or system that is not part of MiCOM system. RCC communicates with and supervises MiCOM system using a protocol. |
| RCP | Remote Control Point<br>Name given to the device or part used to control remotely several bay or sub-station. Usually associate with Remote/Local sub-station control. It is a SCADA interface managed by the MiCOM system through Telecontrol BUS. Several RCP's can be managed with different protocols. |
| Remote Control Mode | When set for a given control point it means that the commands are issued from an upper level and are not allowed from this point. |
| Remote HMI | Remote HMI is a client of the substation HMI server. The client may provide all or part of functions handled by the substation HMI. |
| RI | Read Inhibit<br>This output indicates the availability of an analogue output (e.g. during DAC converting time) |
| RRC | Rapid ReClosure |
| RSVC | Relocatable Static Var Compensator |
| RTU | Remote Terminal Unit<br>Stand alone computer that acquires data and transmit them to RCP or SCADA. Typically it is the C964. RTU link is the TBUS. |
| SAT | Site Acceptance Test<br>Validation procedures executed with the customer on the site. |
| SBMC | Site Based Maintenance Control mode<br>A bay in SBMC mode does not take into account the commands issued from RCP; moreover, some of its digital points and measurements (defined during the configuration phase) are not sent anymore to the RCP (they are " automatically " suppressed). |
| SCE | System Configuration Editor |
| SCL | substation automation System Configuration Language (IEC 61850-6) |

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| SBO | Select Before Operate<br>A control made in two steps, selection and execution. Selection phase give a feedback. It can be used to prepare, reserve during time, configure circuit before execution.<br>Controls are done into a protocol, or physical (DO select with DI Select then DO execute). |
| S-BUS | Station Bus<br>Federal network between PACiS devices, UCA2 and IEC 61850 |
| SCADA | Supervisory Control And Data Acquisition<br>Equivalent to RCC |
| SCP | Substation Control Point<br>Name given to the device or part used to control locally several bays or sub-station. Usually associate with Remote/Local sub-station control. It is commonly PACiS Operator Interface. |
| SCS | Substation Control System |
| SCT | Single Counter |
| Setpoints (analogue) | Analogue setpoints are analogue outputs delivered as current loops. Analogue setpoints are used to send instruction values to the process or to auxiliary devices. |
| Setpoints (digital) | Digital values sent on multiple parallel wired outputs Each wired output represent a bit of the value. Digital setpoints are used to send instruction values to the electrical process or to auxiliary devices. |
| Server | Define in IEC61850 as: entity that provides services to clients or issues unsolicited messages |
| SFC | Sequential Function Chart<br>One of the IEC1131-3 programming languages (language used to define configurable automation). |
| SI | System Indication<br>Binary information that do not come from external interface. It is related to an internal state of the computer (time status, hardware faults…). It is the result of all inner function (AR, …), PSL, or ISaGRAF automation. |
| SICU 4 | Switchgear Intelligent Control Unit<br>Control unit of an intelligent circuit breaker (fourth generation) |
| SNTP | Simple Network Time Protocol |
| SOE | Sequence Of Events<br>Other term for the event list. |
| SP<br>SPS<br>SPC | Single Point<br>Single Point Status<br>Single Point Control |
| ST | Structured Text<br>One of the IEC1131-3 programming languages (language used to define configurable automation). |
| Substation computer | Bay computer used at substation level. |
| Suppression (Automatic) | A binary information belonging to a bay in SBMC mode will be automatically suppressed for the remote control. However changes of state will be signaled locally, at SCP. |
| Suppression (Manual) | A binary information can be suppressed by an order issued from an operator. No subsequent change of state on a “ suppressed information ” can trigger any action such as display, alarm and transmission. |

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| SWR | Switch Redundant<br>MiCOM C264 board Ethernet switch with redundant ethernet |
| SWU | Switch Unit<br>MiCOM C264 board Ethernet switch |
| T101 | Term used for IEC60870-5-101 protocol. |
| T103 | Term used for IEC60870-5-103 protocol |
| T104 | Term used for IEC60870-5-104 protocol |
| TBC | TBC to Be Completed |
| TBD | To Be Defined |
| T-BUS | Telecontrol Bus<br>Generic name of networks and protocols used to communicate between PACiS GTW or MiCOM C264 Telecontrol Interface function and the RCP. Networks are based on RS232, 485, or ethernet (T104). Protocols are IEC 60850-5-101 (T101), Modbus MODICON |
| TCU | Transformer Current Unit<br>MiCOM C264 CT/VT Board: Current acquisition |
| TIU | Transformer Input Unit |
| Topological interlocking | Interlocking algorithm, based on evaluation of topological information of the switchgear arrangement in the HV network, the switchgear kind and position, and defined rules for controlling this kind of switch (e.g. continuity of power supply) |
| TPI | Tap Position Indication (for transformers).<br>Frequently acquired via a Digital Measurement |
| TVU | Transformer Voltage Unit<br>MiCOM C264 CT/VT Board: Voltage acquisition |
| UCA | Utility Communications Architecture<br>Communication standard (mainly US) used for PACiS SBUS communication |
| UPI | Unit Per Impulse<br>Parameter of counter to convert number of pulse to Measurement value. Both data (integer and scaled float) are in common class UCA2 Accumulator. |
| UTC | Universal Time Coordinates (or Universal Time Code)<br>Naming that replace GMT (but it is the same) |
| VDEW | Term used for IEC60870-5-103 protocol |
| VID | VLAN identifier |
| VLAN | Virtual LAN |
| Voltage level | Set of bays whose plants and devices are dealing with the same voltage (e.g. 275kV, 400 kV). |
| VT | Voltage Transformer<br>Basically the electric device connected to process and extracting a voltage measurement. By extension part of a device (MiCOM C264) that receives this AC value and convert it to numerical measurement value. VT are wired in parallel. |

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